PHASE II
ENVIRONMENTAL SERVICES
REPORT

Broad Street Parkway
Nashua, New Hampshire

Volume I

GEI Consultants, Inc.
53 Regional Drive
Concord, NH
603.224.7979

SUBMITTED TO

Fay, Spofford & Thorndike, Inc.

288 South River Road
Bedford, New Hampshire 03110

Richard Van Etten
Environmental Project Manager

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Executive Summary

GEI Consultants, Inc. (GEI) has reported herein the findings of Phase II environmental services work performed for the Broad Street Parkway project in Nashua, New Hampshire. The scope of work for Phase II environmental services was initially established in GEI Proposal No. 9363, dated February 3, 1998.

Asbestos professional services have been provided by RPF Associates Inc. (RPF). RPF has completed (to the extent allowed by the property owners) Phase II detailed surveys for asbestos-containing building materials (ACBMs) in buildings scheduled for demolition. Asbestos was detected in seventy-six groups of suspect ACBM. RPF's asbestos inspection reports are provided in Appendix Volume II of this report.

The extents and types of asbestos-containing materials (ACMs) in the Fimbel Door and Baldwin Street closed asbestos landfills and the Prescott Street uncontrolled asbestos site were investigated by excavating 42 test pits at the three sites. Based on design of the Parkway and the results of test pitting, recommendations will be made by GEI under separate cover to reconsolidate ACMs of the closed landfills and partially remove or cap ACMs at the uncontrolled Prescott Street site.

Asbestos in the general environment of the Parkway was evaluated through a program of 58 borings and 16 test pits. Based on the results of polarized light microscopy analysis, limited amounts of regulated asbestos were found along the railroad grade north of the Nashua River (ground surface ACBM and Chrysotile asbestos in shallow soil), and in the Millyard in the vicinity of the Boiler Building (ground surface ACBM and buried gray Amosite asbestos).

Portions of the Boiler Building are known to contain significant amounts of ACBM in poor condition. The Boiler Building is also known to contain evidence of oil contamination associated with six relic fuel storage tanks located in the eastern portion of the building. Abatement of the asbestos hazard and removal of the fuel storage tanks has to be performed before the Boiler Building can be adequately and safely investigated.

Environmental conditions of oil and hazardous materials (OHM) in the alignment were investigated using a process of file reviews, site reconnaissance, test pitting and soil borings, monitoring well installations, and sampling and analysis. Specific sites investigated included the former 420,000-gallon fuel oil above ground storage tank (AST), and the Fimbel-Door, Mel's Autobody, Barett & Gould, NIMCo, and Bagshaw Company properties. In the course of environmental and geotechnical subsurface investigations, a common fill material contaminated with ash, cinder or slag was identified in the Millyard. This fill has concentrations of carcinogenic polynuclear aromatic hydrocarbons (cPAHs; attributed to the fossil fuel combustion byproduct present in the fill) that may exceed New Hampshire

Department of Environmental Services (NHDES) Contaminated Sites Risk Characterization and Management Policy (RCMP) soil standards.

Sediments in the Nashua River at the proposed bridge crossing were composited and analyzed for waste disposal characterization. Elevated arsenic levels were found in the sediment composite sample.

Two properties were identified through investigation to have contaminated groundwater: the NIMCo property (methyl ethyl ketone and bis(2-ethylhexyl)phthalate) and the Mel's Autobody property (alkyl benzenes). Additional plume delineation and hydrogeologic characterization work is required at both properties. Continuing site investigation work plans for the properties must be developed and performed to support a Groundwater Management Permit (GMP) component of remedy. The current owner is investigating the extent of the apparent release of petroleum at the Mel's Autobody property. The appropriate source control and management of migration remedial response for this site will be defined by the extent of the contamination identified.

There are no drinking water wells at risk of impact from contaminated groundwater at the NIMCo and Mel's Autobody sites. Based on limited data, water quality in the Nashua River is not expected to be adversely or measurably impacted by the levels of known contaminants in groundwater at the NIMCo site.

The predominant pathway for risk of harm exposures to non-asbestos OHM in the alignment is from contact exposure (dermal/ingestion/inhalation) to contaminated fill. And the predominant risk of toxicity identified in Phase II work is from cPAHs in fill contaminated with ash, cinder and slag. The concentrations of contaminants detected in soils, including cPAHs, have not approached or exceeded NHDES RCMP Upper Concentration Limits (UCLs) for soils. It may be possible to allow the contaminated soil (fill) to remain in place provided in is contained beneath clean soil cover or paved roadway such that contact with the contaminated material is removed as a potential exposure pathway. At this time, GEI expects a remedial action plan (RAP) can be developed and approved for contaminated soils that provides for conditions protective of human health and the environment by making the material inaccessible and by limiting or preventing uncontrolled exposures to the material through approved Activity and Use Restrictions (AUR). Surplus contaminated soils may be generated that cannot be placed under effective containment on site. These soils will be disposed of off site at a permitted solid waste landfill.

Site-specific RAPs with AUR will be developed for the 420,000-gallon former AST. Site-specific RAPs with AUR and GMP are expected necessary for the NIMCo and Mel's Autobody sites.

Work disturbing sediment in the Nashua River for bridge pier construction should be planned to contain and recover sediments potentially contaminated with arsenic. The sediments may be acceptable for placement above the water table and beneath bank erosion riprap design for the north bank of the river at the crossing, with approved AUR.

GEI expects new conditions of OHM and asbestos in the environment may be found as demolitions of buildings occur and earthwork proceeds. During construction of the Parkway environmental monitoring for OHM and asbestos will be required.

Issues pertaining to chemical risk assessment and AUR/RAP development for contaminated soils must be coordinated with the NHDES, the City of Nashua, and the NHDOT.

1. Introduction

1.1 Purpose and Scope

GEI Consultants, Inc. (GEI) has prepared this report to summarize the findings of Phase II environmental services performed for planning and design of the Broad Street Parkway project in Nashua, New Hampshire (the Project; Figure 1). Our Phase II results are reported with background for the purpose of placing the objectives, the scope of work and the results in context for the reader. Based on findings, GEI has provided recommendations for developing Remedial Action Plans (RAPs) for the identified risks of harm from oil and hazardous materials (OHM). Results for asbestos testing in the general environment are presented, but comprehensive recommendations for managing Project asbestos issues will be developed by GEI under separate cover. Updated survey results for asbestos containing building materials (ACBM) performed by RPF Associates Inc. (RPF) are appended to this report.

In general, the results of GEI's environmental work suggest issues of OHM contaminated soils and groundwater can be adequately remedied to achieve conditions that are protective of human health and the environment by coordinating waste management measures during construction with Activity and Use Restrictions (AUR) control of land use and/or Groundwater Management Zone (GMZ) control of groundwater use. For the environmental issues identified in our work, an approved RAP can establish where and how the contaminated media may be left in the transportation project corridor without undue risks of harm. Sites warranting source control intervention to remove a continuing point source of non-asbestos OHM contamination have not been identified with possibly two exceptions. As yet the extents of OHM contamination are unknown at the former Mel's Autobody site and the uninvestigated Boiler Building.

Our work was conducted in phases developed in GEI Proposal No. 9363 dated February 3, 1998. Phase I environmental services were reported by GEI in March 1999. Phase I results identified properties within the selected alignment for which additional environmental assessment was needed based on historical land uses or evidence of potential OHM contamination. Phase II environmental services included preliminary asbestos surveys and environmental sampling and analysis to characterize potential OHM contamination identified during Phase I. Our Phase II services were expanded to include pre-acquisition assessment of the tannery waste landfill on the Fimbel Door property and inventory of known underground storage tanks (USTs) and aboveground storage tanks (ASTs) in the alignment. The UST/AST inventory was submitted in January 2001 to the New Hampshire Department of Environmental Services (NHDES) for use in evaluating NH Petroleum Fund eligibility and reimbursement cost issues for the Project. Pre-acquisition assessment of the Fimbel

Door Tannery Waste Landfill was summarized in GEI's correspondence on the subject of the Fimbel Door Corporation property dated November 9, 2000.

Elements of Phase II work completed and reported herein, include:

- Completing authorized preliminary surveys for asbestos-containing building materials (ACBMs) at properties not previously surveyed, and completing detailed surveys for ACBM in buildings scheduled for demolition.

- Completing additional reviews of state and municipal public records to update information for properties with known or potential impacts from OHM within the Project alignment.

- Assessing the status of the Tannery Waste Landfill on the Fimbel Door property based on file reviews. The purpose of GEI's work was to identify potential environmental liability associated with the tannery sludge landfill for property valuation and acquisition considerations by others.

- Obtaining NHDES agreement to leave in-place the buried bottom remnant of a 420,000-gallon AST located at the proposed south abutment for the Nashua River bridge crossing.

- Performing additional preliminary characterization of possible impacts from OHM to soil and groundwater at properties identified from prior work or site reconnaissance. A summary of Phase II environmental sampling performed is provided in Table 1. The approximate locations of borings and test pits are shown on Figure 2. Boring logs and test pit logs are provided in Appendices A and B, respectively.

1.2 Authorization

This work was authorized by signature on July 16, 1998 of a Subcontract Agreement For Professional Service By and Between Fay, Spofford & Thorndike, Inc. and GEI Consultants, Inc., for transportation project Nashua, NRBD-5315(21), 10040-A.

2. Phase II Environmental

This section of our report contains a summary of the Phase II environmental work performed. Background for the scope of site work is provided for context and a summary of the task or site remedial status is made. Recommendations for additional site investigation (SI) or remedial action planning are provided.

Figure 2 is a Site Plan showing the locations of environmental and geotechnical borings and test pits. Asbestos and OHM test parameters for samples obtained from the borings and test pits are shown in Figure 2. The letter/abbreviation code used for the test parameters is contained in the legend. A red colored letter indicates a threshold standard for asbestos (EPA) or OHM (NH S-1 or GW-1) has been exceeded in the test results. The logs for borings (with installed monitoring well details, if applicable) and test pits shown on Figure 2 are contained in Appendix A and Appendix B, respectively.

Reports of asbestos inspections and asbestos testing performed by RPF are provided in Appendix C. Analytical data for Phase II chemical testing are provided in Volume II of this report.

Project documents referred to in our report are referenced in Section 5.

2.1 Asbestos

2.1.1 Asbestos in Buildings

In 1991, the following fifteen commercial buildings on thirteen properties were identified that could potentially require demolition to construct the Parkway depending on the corridor alignment alternative selected.

Barett & Gould, Inc.	(former) Morrison Tool Company
Becker Offset Printing (former LeClair's Autobody)	NH Industrial Suppliers (2 buildings)
Boiler Building	Nashua Industrial Machine Company
Brown Company	Servus Footwear (in part)
D F Shea	Stanley Elevator (Quonset Hut and Warehouse buildings)
Market at 40 Pine	
Mel's Autobody	
Millyard Outlet Mall (in part/eastern end)	

Preliminary asbestos assessments were undertaken to inspect these structures to identify highly suspect asbestos-containing building materials (ACBMs) for the purpose of estimating the costs associated with the safe demolition and disposal of ACBMs. The results of the preliminary inspections for ACBMs were reported by RPF in December 1991. These results were contained in Appendix B, Volume II of GEI's 1992 Phase III Report.

Between 1992 and 1998, the set of buildings designated for potential demolition was modified as part of the Parkway alignment selection process. By 1998, two commercial buildings (Nashua Outdoor Power Equipment/formerly Plywood Ranch and Fimbel Door) were added to the list of buildings designated for potential demolition while other buildings (6) were removed. The modified list of buildings designated for demolition is shown below.

(NH. Industrial Supplier 1+2) Removed

Barett & Gould, Inc.	Morrison Tool Company
Becker Offset Printing (former LeClair's Autobody)	Stanley Elevator (Quonset Hut and Warehouse buildings)
Boiler Building	Nashua Industrial Machine Company
Brown Company	Nashua Outdoor Power Equipment (added)
Mel's Autobody	Fimbel Door (added)

GEI's 1998 Phase I environmental scope of work included preliminary asbestos inspections for buildings added to the modified list, and updating the 1991 ACBM information obtained for buildings still designated for demolition (in whole or in part). RPF performed a preliminary asbestos inspection on August 18, 1998 at the Nashua Outdoor Power Equipment building (formerly Plywood Ranch) and updated ACBM survey information for six buildings based on return site visits performed in August 1998. This work was reported by RPF in its Phase I *Partial Completion Report* dated November 20, 1998 (Appendix C).

During the period from April 1999 through September 1999, RPF completed Phase II detailed surveys for ACBMs in the following buildings scheduled for demolition.

Barett & Gould, Inc.	Fimbel Door
Becker Offset Printing (former LeClair's)	Mel's Autobody
Boiler Building	Stanley Elevator
Brown Products	Nashua Industrial Machine Company

One hundred and ninety-seven (197) groups of accessible suspect ACBM were identified in the building materials inspected. A total of four hundred and seventy-two (472) bulk material samples were collected among the different ACBM groups for polarized light microscopy (PLM) asbestos analysis. Asbestos was detected in seventy-six (76) groups of suspect ACBM. Details of the Phase II building inspections performed to date including methodology and limitations, discussion of the results, and preliminary recommendations for management of ACBM issues are provided in RPF's Phase II *Asbestos Inspection Findings* report, dated July 30, 2001 (Appendix C).

Full inspections of the Nashua Outdoor Power Equipment (formerly Plywood Ranch) and Morrison Tool Company buildings have not completed. At Morrison Tool, the owner has not provided access to the building to date. At the renovated Nashua Outdoor Power Equipment building, the owner has not authorized complete sampling of suspect ACBMs to date. ACBM survey work should be completed for these two facilities as property acquisition/demolition planning proceeds and access is authorized.

2.1.2 Asbestos in the Environment

Test pit explorations and surface debris sampling to assess the presence of asbestos in the environment along alternative corridor alignments were initially performed and reported in GEI's 1990 Phase II and 1992 Phase III studies.

By 1998, environmental asbestos issues were focused to the selected alignment. State and municipal file reviews and alignment reconnaissance were performed in Phase I of environmental work performed by GEI. Since 1998, geotechnical investigations by GEI have been coordinated to include Phase II environmental asbestos sampling objectives. In 1998, seventy-five (75) soil samples were selected from 58 boring locations and 16 test pit locations for asbestos analysis by PLM (EPA Method 600/R-93/116). Asbestos testing was performed along the future Parkway, the Sargent Avenue Extension, the boat ramp access road and the former railroad bed west of West Hollis Road. The results are summarized in Table 2. Asbestos sampling locations are shown on Figure 2. The locations of samples containing regulated amounts of asbestos (i.e., greater than 1percent asbestos by volume) are differentiated in Figure 2 with a red letter "A". RPF findings and reports of asbestos testing are provided in Appendix C.

Uncontrolled asbestos found in the environment (excluding the known Prescott Street Site; see the following text section) has been limited to the following.

1. Ground surface ACBM (cement board at TP105 and TP106) found along the railroad grade north of the Nashua River and west from the proposed Fairmont Street Bridge. These locations are outside of the current Parkway alignment.
2. Ground surface ACBM (tile at TP101 and cement board at TP102) found along the railroad grade north of the Nashua River and west from the proposed Fairmont Street Bridge. These locations are within the current Parkway alignment.
3. Chrysotile asbestos in shallow soils (silty gravel from 0 to 2 feet) sampled at boring location B808 on the north bank of the proposed Nashua River Bridge crossing.
4. Ground surface ACBM (cement board at TP108A), and ACBM/ACM in shallow fill (0 to 5 feet) in the Millyard in the area of the former 420,000-gallon above ground storage tank (tile at TP108 and gray Amosite asbestos at TP3). These locations are just south of the south abutment for the proposed Nashua River Bridge.
5. ACM described as tar/asphalt debris on the ground surface at TP109 alongside the boiler building. The boiler building contains significant degraded ACBMs and uncontrolled asbestos contamination as reported by RPF in Appendix C.

Based on discussions held with EPA personnel in 1999, there is suspected buried asbestos-containing materials (ACMs) in the paved areas east of the Nashua Outdoor Power Equipment building (the former Plywood Ranch site; Building "B" on Figure 2). The EPA came to suspect there was ACM under existing pavement on the former Plywood Ranch property during its work in 1992 to close known ACMs along the riverbank here under riprap. EPA had not conducted explorations in 1992 to verify that ACMs were present under the pavement on the Plywood Ranch site. The proposed Parkway will be constructed over this area of suspected buried ACM, north of the retaining wall. It is possible that ACMs will

be encountered during this work, and construction specifications should provide for this expectation.

2.1.3 Asbestos Landfills

In April 2001, GEI performed test pitting at the Fimbel-Door and Baldwin Street closed asbestos landfills and at the Prescott Street uncontrolled asbestos site to delineate the lateral and vertical extents of asbestos wastes. This work included PLM asbestos analysis of 34 bulk media or soil composite samples from 42 test pits at the three sites. The results of explorations at the asbestos landfills and the uncontrolled asbestos Prescott Street Site will be reported by GEI under separate cover. Recommendations will be made to reconsolidate the Fimbel-Door and Baldwin Street asbestos landfills, and partially remove or cap asbestos wastes at the uncontrolled Prescott Street site.
GEI's asbestos report will discuss asbestos monitoring, risk suppression and waste management during construction. Qualified asbestos personnel will be required to monitor the construction environment and oversee asbestos controls in accordance New Hampshire Administrative Rules for *Management and Control of Asbestos Waste Disposal Sites*, Env-Wm 3900, effective February 15, 2002.

2.2 NHDES File Update Review

GEI last reported the results of environmental file reviews in our March 1999 Phase I Preliminary Assessment Report. In April 2001 and again in October 2001, GEI reviewed the NHDES *Remediation Site Information* list and the *Initial Response Spill Information* list as contained on the NHDES' web page. No new significant environmental release of oil or hazardous material or contaminated site discovery was identified within the Project alignment during GEI's 2001 update reviews.

2.3 Fimbel Door Corporation Property

Phase II environmental services included a focused environmental assessment of three investigated environmental conditions for the Fimbel Door Corporation (FDC) property at 24 Fox Street, Nashua, New Hampshire. This work was initially presented by GEI in Project correspondence dated November 9, 2000 (GEI, 2000). Our focused condition assessments were based on a review of NHDES site files performed on October 3, 2000, and follow-up telephone interviews with NHDES and City of Nashua NH representatives familiar with the property's environmental history and record of investigation. The work was done to provide a current summary of what is known about three environmental conditions on the property (asbestos landfills; underground storage tanks (USTs), and; the tannery waste landfill) for pre-acquisition valuation by the NHDOT. The status of FDC relative to compliance with Resource Conservation and Recovery Act (RCRA) requirements for facility closure (40 CFR Part 264: Subpart G) has not been researched by GEI under the current scope of work.

An abridged version of our November 2000 Focused Environmental Assessment for the FDC property is provided for completeness of Phase II service reporting.

2.3.1 General Background

The FDC property (City Tax Assessor's Map 71, Lot 1) consists of approximately 3 acres of land in a combined commercial and residential area of Nashua, NH. The northern portion of the property, accessed from Fox Street, is developed with manufacturing facilities and paved parking areas. FDC is registered as an active conditionally exempt small quantity (CESQ) hazardous waste generator (NHD001083476) and underground storage tank (UST) facility. The property includes two closed ACM landfills and a closed tannery waste landfill. The property is bordered by commercially developed property to the northwest (NH Industrial Supplies, Inc.), the Boston and Maine Railroad to the north and east, the Nashua River to the west, and the Granite State Leather hazardous waste site (CERCLIS # NHD981889629, NHDES No.198404002) to the south. In 1989, the NHDES estimated there were 20 residential properties within one-eight mile to the northeast of the tannery waste landfill on the property. The Granite State Leather hazardous waste site is situated generally cross gradient and/or downgradient from the FDC property.

The geology of the property has been described as fill underlain by glaciofluvial delta sands, underlain by glacial till and schist bedrock. Overburden soils range in depth from 37 feet to 64 feet. Groundwater is found at depths ranging from approximately 22 feet to 36 feet bgs. The direction of groundwater flow beneath the property has been investigated and is interpreted to flow generally to the west and southwest toward the Nashua River, and away from the residential development.

Areas of potential environmental liability identified for the FDC property include, but may not be limited to, the asbestos landfills, the historical storage of fuel products underground, and the tannery waste sludge landfill.

2.3.2 Asbestos Landfill Areas

In April 1985, the NHDES Health Risk Assessment Unit and the United States Environmental Protection Agency (EPA) Oil and Hazardous Materials Section identified two areas of the FDC property contaminated with ACM. One of these areas, identified as Area A, is located immediately west of the FDC manufacturing facility. The other area, identified as Area B, is located east of manufacturing facility, along the south side of the B&M Railroad tracks. The Fimbel Door Area B asbestos landfill lies within the construction corridor of the Parkway. The Area A landfill is wholly outside of the construction corridor.

In April 1986, pursuant to the Comprehensive Environmental Response and Liability Act (CERCLA), a Consent Order was executed between FDC and the EPA. By November 1986, a Response Action Plan for remediation of the two asbestos disposal areas, prepared by Wehran Engineering Corporation (Wehran), had been reviewed and authorized by the EPA and the NHDES.

2.3.2.1 Asbestos Remediation

Based on the Response Action Certification Report by Wehran dated January 15, 1988 (Wehran, 1988), remediation of the FDC asbestos disposal areas began in December 1986. Remedial actions for Areas A and B included removing 735 cubic yards of ACM and covering the ACM left in-place beneath sandy fill (825 cubic yards) and loam (290 cubic yards) or crushed stone (150 cubic yards). Final asbestos response actions were implemented in May 1987 with the application of approximately 480 tons of asphalt covering all of Area B and the level portions of Area A, and hydro-seeding of the embankment of Area A. In December 1987, the EPA performed an inspection of the remediated asbestos landfills and provided consent of closure. This was followed by Wehran's submittal of the Response Action Certification Report in January 1988.

2.3.2.2 Asbestos-Contaminated Tamposi Property Transfer and Remediation

In 1988, a portion of land on the abutting property Tax Map 62, Lot 100 was determined as having been contaminated by ACM that originated from asbestos Area B of the FDC property. As a result of negotiation between the owners, Tamposi Family Investment Properties, Inc. transferred ownership of that portion of their property contaminated with ACM to FDC under the City of Nashua NH Assessor's Office Transfer Plan #2813 (December 1989), as recorded in the Hillsborough County Registry of Deeds on February 9, 1990.

The acquired ACM-contaminated land was remediated in place by FDC using a cover of fill, non-woven geofabric, and riprap to achieve a minimum cover thickness of two feet. Work was performed by LRS Enviro-Services Inc. in 1989. The NHDES inspected the asbestos remedy on January 12, 1990 and subsequently granted full closure for the ACM remedy on February 21, 1990.

2.3.2.3 Asbestos Area B Test Pit Investigation – April 2001

With NHDES authorization, the FDC Area B closed asbestos landfill was investigated by test pitting (TP200 thru TP207; Figure 2) in April 2001. GEI's objective for the subsurface investigation in a closed asbestos landfill was to compile information on the footprint, volume and character of the ACM contained in Area B to determine its impact on the design and construction of the Parkway. The results of this work including recommendations for construction management and final remedy of the FDC Area B ACM asbestos will be reported by GEI under separate cover.

2.3.3 Underground Storage Tanks

The NHDES UST Registration Listing for FDC in Nashua (UST Facility No. 0-112822) indicates four USTs were registered and closed at the property. A summary of the information contained in the listing is provided below:

Tank #	Capacity	Type	Substance Stored	Date Installed	Date Closed	Closure Type
1-	17,900 gal	Steel	#2 Heating Oil	1952	09-Feb-89	Removed
2-	6,670 gal	Steel	#2 Heating Oil	1968	09-Feb-89	Removed
3-	10,000 gal	Steel	Gasoline	1981	17-Aug-95	Removed
4-	10,000 gal	Steel	Diesel	1981	17-Aug-95	Removed

The registered USTs were all closed by removal from the ground. No records concerning the 1989 heating oil tank closures were found in the NHDES files. Documents concerning the 1995 tank closures were found and reviewed.

2.3.3.1 Evidence of a Gasoline Release

Total Waste Management Corporation (TWM) cleaned, removed, sampled and reported the August 17, 1995 UST closures. One 10,000-gallon UST was used for storage of gasoline. The other held diesel fuel. Both tanks were reported to be in good condition with no observed holes.

Although the gasoline tank was observed to be in good condition, gasoline-contaminated soils were encountered in the excavation during its removal. Approximately 80 cubic yards of soil were removed from the excavation for disposal. Only the soil needed to remove the tank from the ground was excavated. The excavation measured 16-feet wide by 40-feet long by 12-feet deep. No groundwater was present in the bottom of the excavation. Discrete soil samples (2) were taken from the excavation bottom for laboratory analysis of VOCs and the excavation was backfilled with clean borrow-soils from off-site. Naphthalene was detected in the excavation bottom soils at concentrations exceeding NHDES cleanup guidelines. The detection limits were elevated for other VOCs in the samples.

The diesel tank was excavated in 1995 without evidence of a release of product. One composite sample from the diesel tank's excavation bottom and sidewalls was collected for analysis of VOCs, total petroleum hydrocarbons (TPH), and polynuclear aromatic hydrocarbons (PAHs). Supported by non-detect analytical results, there was no evidence of a release of product. The excavation was backfilled using clean borrow soils.

2.3.3.2 Initial Site Characterization Study

Based on observed and analytical evidence of a release of gasoline, the NHDES requested an Initial Site Characterization (ISC) be performed by FDC to evaluate potential impacts to soil and groundwater. FDC agreed in correspondence to the NHDES in February 1996 to perform the ISC.

On August 4, 2000, FDC submitted to the NHDES an ISC report regarding the gasoline release. Woodard & Curran (W&C) performed the ISC in May 2000. Geoprobe borings were performed. One Geoprobe boring was drilled in the area of the former 10,000-gallon

gasoline UST. Two other Geoprobe borings were drilled in areas inferred as downgradient from the gasoline release. The borings were advanced to depths of up to 48 feet bgs and no observed or analytical evidence (VOCs/8260 or TPH/8015) of residual petroleum contamination was detected. Groundwater was not encountered in the soil borings.

Based on results of the ISC, the NHDES concluded the investigation of impacts from the gasoline release was satisfactory and no additional investigation, remedial measures, or groundwater monitoring was necessary. The LUST project file for the site (DES#198404000-LUST-WLP3) was closed by the ORCB on August 29, 2000.

2.3.4 FDC Tannery Waste Landfill

The tannery waste landfill on the FDC property was constructed in 1979 for land disposal of tannery wastes generated from Mohawk Associates, Inc. (Mohawk) of Fairmount Street, Nashua, NH. The Mohawk tannery was located on an abutting property, to the south of the FDC property. The construction and operation of the tannery waste landfill by Mohawk on the FDC property was done pursuant to an agreement between the parties. Mohawk was to deposit dewatered sludge cake from its leather tanning process in the landfill.

The landfill was constructed on land described as a topographic valley trending east to west and sloping downward to the east. The landfill was constructed by excavating land on the west side of the site and filling to the east. The landfill was lined with a 20-mil-thick polyvinyl chloride (PVC) liner. The liner at the perimeter of the landfill is shown in cross-section (Goldberg-Zoino & Associates, Inc. 1985) to be at an approximate elevation 58 feet above mean sea level (MSL). The approximate elevation of the liner at the bottom of the landfill is 45 feet MSL. Leachate produced by dewatering of the sludge and rainwater infiltration was collected in a leachate pond constructed on the liner near the western edge of the landfill. A concrete sump pit was constructed in the western quarter of the landfill to house a leachate pump. During active operation of the tannery, accumulated water was pumped periodically from the sludge landfill sump back through an underground pipe to the waste treatment facility on the Mohawk property. GEI estimates the conveyance distance to have been approximately 650 feet.

The approximate elevation of the unconfined groundwater table beneath the landfill is 30 feet MSL, or about 15 feet below the landfill liner. The construction of the landfill in 1979 was described to have been in accordance with NHDES Bureau of Solid Waste Management site-specific recommendations for "water table clearance".

2.3.4.1 Estimate of Sludge Deposit at Operational Closure - 1984

The landfill was constructed to receive dewatered sludge generated by Mohawk at an estimated quantity of 2,000 gallons per day (gpd). Mohawk proposed a Phase II expansion of the landfill in May 1983. At that time, Mohawk's sludge output quantities were estimated to be approximately 8,000 gpd. It is believed the proposed expansion did not occur, as operation of the landfill ceased in 1984 with the closure of the Mohawk facility. At

operational closure, the footprint of the sludge landfill was approximately 20,000 square feet, with the sludge deposit estimated to be up to 25 feet deep.

2.3.4.2 Granite State Leathers, Inc. Drum Dumping

At about the time that the Mohawk facility was closed, Mohawk Associates, Inc. merged with Amoskeag Leather Finishing of Manchester, NH, forming the corporate entity, Granite State Leathers, Inc. (GSL).

In November 1984, during its closing, drummed wastes (ignitable hazardous wastes) from the Amoskeag-Manchester facility were brought to the FDC landfill for disposal. Under directions by GSL, 17 or 18 drums of sludge and liquid wastes were emptied into the FDC landfill on or before December 3, 1984. Records indicate that ten samples of the materials in the drums were collected on November 2, 1984, by Amoskeag before the drums were brought to the FDC landfill for disposal. The samples taken from the drums were described in written notes and stored in an office at the Mohawk facility in Nashua.

The NHDES discovered the transfer of drummed waste from the Amoskeag-Manchester facility for disposal to the FDC tannery waste landfill during a RCRA closure inspection of Amoskeag in December 1984. The NHDES issued Notice of Violation and Order of Abatement (NOV/OA) No. 84-34 to GSL sometime prior to December 21, 1984.

2.3.4.3 NHDES Division of Public Health Services Investigation

On May 15, 1985, the NHDES Office of Waste Management (OWM) Division of Public Health Services (DPHS) performed inspections at the Amoskeag, Mohawk, and FDC sites. At the FDC tannery landfill site, the inspectors observed 17 empty drums in the southwest corner of the landfill, which were identified by GSL as the drums that originated from their Amoskeag facility. The inspectors identified two "spill areas" in the FDC landfill where it was suspected that the drum contents were poured onto the sludge monofill. They collected one "spill area composite" sludge sample from the two suspected spill areas. They also collected a landfill sludge "background" sample from outside the spill areas. Finally, the NHDES composited three liquid waste samples from the drum waste samples that had been taken back in November 1984.

The NHDES samples were analyzed in May/June 1985. The results for the three composite samples of the Amoskeag drummed waste indicated the material had the following chemical characteristics:

Parameter	Result	Note
Flash Point	<65 ^{O}F	All 3 samples
Di-n-butyl phthalate	1,300 µg/g of liquid	1 of 3 samples - No.02 Amoskeag 3rd Floor
Bis-2-ethylhexyl phthalate	420,000 µg/g of liquid	Same as above
toluene, ethylbenzene, xylenes	29,000 mg/l 5,500 mg/l 32,000 mg/l	No.01 - Amoskeag Basement No.02 - " 3rd Floor No.03 - " 4th Floor
MEK, MIBK	16,000 mg/l	1 of 3 samples - No.03 Amoskeag 4th Floor
Method detection limits for VOCs/Method 8420 were 5 - 25 mg/l		

The results of the analyses indicate that the drummed wastes emptied onto the FDC landfill included ignitable, toxic waste that is considered hazardous under RCRA regulations.

Some of the constituents detected in the composite samples of the drummed wastes were detected in the composite spill area sample but not in the background sludge sample. This supports the suspected spill areas as the locations where the contents of the drums were released to the ground.

On May 17, 1985, NOV/OA No. 85-24 was issued by the NHDES to GSL to stop all disposals of off-site wastes to the FDC tannery waste landfill. There is no record observed by GEI to indicate that any additional drummed wastes were disposed of into the FDC landfill, other than the 17 or 18 drums taken from the Amoskeag facility on or before December 3, 1984.

2.3.4.4 1992 Remedial Investigation/Feasibility Study for Landfill Closure

In 1992, Woodard & Curran Inc. (W&C) performed a Remedial Investigation/Focused Feasibility Study (RI/FFS) for closure of the FDC landfill. A geophysical survey using magnetic induction (MI) was conducted to determine if drums were buried in the landfill. Five anomalous areas were identified and subsequently investigated in test pit excavations. One empty crushed drum was found under cover of soil and metal, other than drums, was found at two of the other MI anomalies. No ferrous-metal source was found in the test pits excavated at two the five anomalous MI areas.

The results of test pit explorations, as well as borings drilled in 1995 to characterize the sludge at depth, indicated the following:

- The landfill contains a monofill of tannery sludge with alternating layers of sandy soil. Landfill operations reportedly used lime and sand backfill to control odors and stabilize the sludge.
- The sludge is not a RCRA hazardous waste.

- The landfill is lined and, where observed in test pits, the liner was in good condition. The sludge deposits were observed to extend beyond the edge of the liner by 5 to 10 feet.
- The bottom of the lined landfill is approximately 15 feet above the groundwater table.

W&C installed four additional monitoring wells outside of the landfill during the RI/FFS. Based on groundwater contours developed using a network of 8 monitoring wells sampled on January 15, 1992, groundwater is inferred to flow beneath the landfill in a west to southwest direction.

Based on the result of samples collected in January 1992, groundwater quality appears not to have been adversely affected by the tannery waste sludge monofill. Detectable concentrations of several inorganic metals including arsenic, barium, chromium, and lead were present in downgradient groundwater, but not at concentrations exceeding Federal Maximum Contaminant Levels for drinking water (MCLs) with one exception. Arsenic was detected at a concentration of 0.262 mg/L in downgradient well F-1. W&C suggested that arsenic was not a significant constituent in analysis of the source material.

W&C concluded in their 1992 RI/FFS that the tannery sludge monofill was not a characteristic hazardous waste. The material is generally contained inside a liner of apparently good condition, and was demonstrated not to be a source of regulated chemical contaminants to groundwater. For these reasons, a solid waste landfill closure and post-closure monitoring program were proposed as appropriate closure options.

2.3.4.5 Solid Waste Landfill Closure and Post-Closure Groundwater Monitoring

On March 13, 1992, the NHDES WMD agreed that closure of the FDC landfill in accordance with NH Solid Wastes Rules was appropriate. In June 1995 (11 years after pumping of leachate had stopped), the hydraulic head on the liner was estimated to range from 5 to 10 feet. The area of the landfill was estimated to be 0.5 acres, and the volume of sludge contained in the landfill was estimated to be up to 20,000 cubic yards.

Based on additional deep sludge, groundwater, and leachate pond water characterization studies performed in July 1995, and on the Closure Plan and Engineering Report completed by W&C in September 1996, the NHDES granted approval of FDC's (Solid Waste) Closure Plan for the tannery waste landfill in October 1996. Construction of the landfill cover system was completed in December 1997. The cover design included a 40-mil-thick geomembrane cover extending beyond the limits of the sludge with a geocomposite drainage system installed to create recessed troughs intended to capture and direct run-off water to HDPE drainage pipes. The landfill closure design included a leachate monitoring and collection sump and landfill gas venting system. Prior to construction, the existing leachate pond and sump were pumped dry. The leachate water was transported to the Nashua Wastewater Treatment Plant (WTP) for treatment and disposal.

In 1996, a Groundwater Management Permit for the site (No. GMP-840400-N-001) was issued to FDC. The GMP established a program of water quality monitoring for up to 5

years, at which time renewal of the GMP will be required if contaminant levels remain above the AGQS. Groundwater monitoring results from November 1996 through April 2000 have been reviewed by GEI. Monitoring results indicate dissolved arsenic concentrations at one or two wells (F-1 and F-7) have repeatedly exceeded AGQS. All other RCRA metal concentrations in monitored site groundwater over this period have met AGQS. Only trace levels of VOCs have been found in site groundwater, and no semi-VOCs have been detected in site groundwater over this monitoring period.

The 1999 Annual GMP Report for the site indicated that landfill leachate was pumped on five occasions in 1999. Leachate volumes pumped ranged from 1,500 gallons in August 1999 to 2,300 gallons in December 1999. W&C indicated in the 1999 Annual GMP Report that the leachate is generated by the dewatering of the sludge, and is expected to decrease with time (note again that the landfill cover system was completed in December 1997). Leachate pumped from the landfill was transported to the Nashua WTP for treatment and disposal.

The Tannery Sludge Landfill GMP was due to expire in May 2001.

2.3.5 Remedial Status Summary

Asbestos Landfills:

The two asbestos landfills on the site have been capped and are considered by NHDES to be closed. The Fimbel Door Area B asbestos landfill includes contiguous land formerly owned by Tamposi Family Investment Properties. The Area B asbestos landfill is partially within the proposed construction corridor. Remedial action planning with regard to Project design, health and safety, asbestos waste disposal management, and AUR as it impacts the closed FDC Area B asbestos landfill will be discussed by GEI under separate cover.

USTs:

The four registered USTs on the FDC property have been removed. Gasoline impacted soils were encountered in one of two UST excavations performed in 1995. The response investigation was performed in 2000 and found no evidence of residual petroleum contamination in soils. Groundwater was not encountered in the study. Based on the results of the characterization, the site LUST project was closed by NHDES in August 2000 with no further action.

Tannery Waste Landfill:

The 0.5-acre landfill was constructed in 1979 for the disposal of sludge-cake produced by Mohawk Tannery's leather tanning process. The landfill was lined with a 20-mil-thick PVC membrane. Sludge wastes extend beyond the edges of the liner by about 5 to 10 feet. The volume of sludge contained in the landfill at operational closure in 1984 was estimated to be up to 20,000 cubic yards.

The NHDES agreed in 1995 that the sludge monofill should be closed under NH Solid waste Rules, and in 1997 the landfill was closed. The cap consists of a 40 mil-thick geomembrane extending beyond the limits of the sludge wastes with a geocomposite drainage system to direct runoff from the cap. The landfill also includes a gas venting system and a sump to monitor and collect leachate that accumulates on the top of the liner

Groundwater monitoring has been conducted under a NHDES GMP since 1996. Results to date indicate groundwater downgradient of the site contains levels of arsenic above AGQS.

In 1999, significant quantities of leachate (ranging from 1,500 to 2,300 gallons bimonthly) were pumped from the capped landfill and transported to the Nashua WTP for treatment and disposal. If, as was indicated by W&C, the source of the leachate is from dewatering of the sludge, then the quantity of leachate would be expected to decrease over time. However, if some or all of the leachate generation is attributable to leakage through the cap, then the quantity of leachate generated may not decrease over time. The leachate to date has met pre-treatment standards for acceptance at the Nashua WTP.

2.4 Mel's Autobody

The Mel's Autobody site is a former Chevron service station located on the northeast corner of West Hollis and Pine Streets (Figures 2 and 3). The approximately 0.1 acre lot is developed with a 2-story garage building heated by oil stored inside in an approximately 275-gallon above ground storage tank (AST). The site is level and paved. Mel's Autobody is registered as an active RCRA hazardous waste generator (NHD104647599). Its last hazardous waste generator notification was effective March 6, 1999 under the RCRA regulated classification of conditionally exempt small quantity generator (40 CFR Part 261.5).

GEI personnel met the property owner Mr. Delmar Langliss to conduct a site reconnaissance on December 27, 2000. Mr. Langliss provided GEI with a plan of the site that indicated four (4) underground storage tanks (USTs) are present on-site.

1 x 5,000-gallon "regular" unleaded gasoline	1 x 3,000-gallon "used" oil
1 x 4,500-gallon "Supreme" unleaded gasoline	1 x 500-gallon kerosene

Mr. Langliss further indicated one or more of the tanks might have been filled with "mud" prior to his acquisition of the property approximately 30 years ago. GEI personnel observed the fill pipes for the four alleged USTs.

2.4.1 Phase II Preliminary Site Investigation

2.4.1.1 Ground Penetrating Radar

Ground penetrating radar (GPR) was used to confirm the presence of 4 USTs on-site at locations consistent with the information and plot plan provided by the owner. GEI observed Kick Geoexplorations (Kick) of Dunstable, MA perform a GPR survey of the asphalt parking areas of the site on December 27, 2000. The survey was performed on a 5-foot grid using a Subsurface Interface Radar System-3 Model PR 8300 recorder with a 500-megahertz antenna. GPR located four USTs buried approximately 1.8 feet to 3.5 feet below ground surface. Two large USTs (approximately 22 feet and 27 feet long) were located on the west side of the garage building. Two smaller tanks (approximately 9 feet and 10 feet long) were located on the south side of the garage building. Figure 3 shows the interpreted location of the USTs based on the Kick GPR report. With the presence and approximate locations of the USTs confirmed, GEI implemented a subsurface boring program to evaluate subsurface conditions.

2.4.1.2 Soil Borings with Installed Monitoring Wells

GEI observed Maine Test Borings, Inc. (MTB) of Orrington, Maine drill three soil borings (MA1 – MA3) and install two monitoring wells (MA1 and MA3) in overburden soils from February 28, 2001 through March 2, 2001. The approximate locations of the borings are shown on Figure 3. The borings were advanced using 4-inch solid stem augers, 5.25-inch hollow stem augers, and 4-inch case and wash drilling techniques. Split spoon sampling was performed at 5-foot intervals in the borings. Soils recovered in each spoon sample were described and field screened for VOCs using a photoionization detector (PID). The borings were advanced to bedrock. Refusal on bedrock was confirmed by rock coring. Based on field observations and soil vapor screening results, 4 soil samples from 3 borings were submitted for laboratory analysis of VOCs and total petroleum hydrocarbons (TPH). If no VOCs were detected in field screening results and observations did not suggest otherwise, saturated split spoon soils recovered closest to the groundwater/soil interface were submitted for VOCs and TPH analyses. Monitoring wells were installed (screened across the water table) at two of the three boring locations (MA1 and MA3). A well was not installed in boring MA2 because bedrock was encountered above the water table. Test boring logs, which include split spoon soil screening results and monitoring well installation details, are provided in Appendix A.

2.4.1.3 Soils

The soils encountered in test borings MA1, MA2, and MA3 consisted of narrowly graded sand fill overlying narrowly to widely graded, stratified, native sand. The groundwater table measured on March 28, 2001 ranged from 22.7 to 23.6 feet bgs. Bedrock was encountered at depths ranging from 22.4 feet (MA2) to 31.7 feet bgs.

In an inferred downgradient location from the gasoline USTs, elevated concentrations of total VOCs (TVOCs) were detected in field PID screening tests of saturated soils recovered from

26 ft bgs (S6) and 31 ft bgs (S7) in boring MA1 (600 and 200 ppm TVOCs, respectively). Detectable concentrations of TVOCs were not found by PID screening of split spoon soils recovered above the water table in MA1. Two soil samples obtained from about 26 feet and 31 feet bgs in MA1 were submitted to Eastern Analytical, Inc. (EAI) of Concord, NH. A soil sample obtained from a depth of about 26 feet bgs in MA1 also was submitted for VOCs analysis. The results of analysis are contained in EAI Laboratory Report #25392 provided in Volume II of this report.

Boring MA3 was drilled in a location near to and likely upgradient from the kerosene and used oil USTs on-site. There was no field indication in overburden soils of TVOC-contamination at MA3. Saturated soils from 25 to 27 feet bgs, about 2-feet below the groundwater table in March 2001, were submitted for laboratory analysis of TPH and VOCs.

Boring MA2 (Figure 3) was found dry to bedrock at about 22.5 ft bgs. There was no field indication of volatile contamination in soils at location MA2. Native sand recovered from 15 to 17 feet bgs in MA2 9about 6 feet below the fill) was submitted for analysis of TPH and VOCs.

A summary of the analytical results for soils collected for preliminary investigation at Mel's Autobody is provided in Table 3 and discussed below.

- Petroleum-based alkyl substituted benzenes, including toluene, ethylbenzene, xylenes and alkyl benzenes (as defined as a chemical group in the RCMP) were detected in soils below the water table in boring MA1.
- The sum concentration of alkyl benzene compounds was 133 mg/kg at MA1 at about 26 feet bgs. The NHDES RCMP category NH S-1, NH S-2 and NH S-3 soil standard for alkyl benzene compounds is 59 mg/kg.
- The reporting limit for benzene in the soils obtained from MA1 at 26 feet bgs ($\geq$0.4 mg/k) was elevated due to the high concentrations of alkyl benzenes in the sample. The NH soil standard for benzene is 0.3 mg/kg.
- A low level of TPH (130 mg/kg) was detected in the soil sample obtained from a depth of about 26 feet in MA1. Soils recovered 5-feet deeper in boring MA1 contained no detectable concentration of TPH (< 50 mg/kg). A sample for VOCs was not collected from this deeper split spoon.
- Laboratory results for VOCs and TPH in soils from borings MA2 and MA3 confirmed field PID indications of no detectable petroleum contamination in soils at these locations.

2.4.1.4 Groundwater

Approximately one month after installation, overburden groundwater from monitoring wells MA1 and MA3 was purged and sampled for VOCs/8260B, polynuclear aromatic hydrocarbons (PAHs/8270C), and TPH. The results of analysis are contained in EAI Laboratory Report #25647 provided in Volume II of this report. A summary of the chemical testing results for groundwater at the Mel's Autobody site is provided in Table 4 and discussed below.

- Consistent with the results for saturated soils in boring MA1, elevated levels of petroleum-based alkyl-benzenes were present in groundwater at MA1. The sum concentration of alkyl benzene compounds in groundwater at MA1 in March 2001 was 1,650 micrograms per liter (µg/l). The NHDES Ambient Groundwater Quality Standard (AGQS) for total alkyl benzene compounds is 50 µg/l.
- Other light fuel range monoaromatic VOCs were detected in groundwater sample MA1, but at low-level concentrations below the AGQS. Note that the reporting limit for benzene in the groundwater sample MA1 (≥10 µg/L) was elevated above the level of its AGQS (5 µg/L) due to laboratory dilution necessary to report the elevated concentrations of alkyl benzene compounds.
- In the PAH-fraction analysis of groundwater at MA1, two diaromatic petroleum-based semi-volatiles (including naphthalene) were detected, but at concentrations compliant with AGQS. The concentration of naphthalene found (11 µg/L) was less than but of the same order of magnitude as its AGQS (20 µg/L). The concentration of TPH in the range of #2 diesel/kerosene fuels through #6 fuel/motor oils (i.e., C9 – C40) in groundwater at MA1 in March 2001 was 2.3 milligrams per liter (mg/l). There is not an AGQS standard for TPH in groundwater, and this concentration of TPH is judged to be relatively low.
- Consistent with field indications observed in advancing boring MA3 near the presumed gasoline USTs, there was no laboratory detection of reportable concentrations of VOCs/8260B, PAHs/8270C, or TPH/8100 in groundwater sampled at location MA3.

Regional groundwater flow in overburden in the area of the Mel's Autobody site is assumed to be generally to the west towards the Falls Park wetland and Nashua River. However, the actual direction(s) of groundwater flow beneath the property is uncertain because only two wells were installed. Recall that boring MA2 was found dry to a bedrock pinnacle.

2.4.1.5 Waste Oil Sump

GEI personnel observed a waste oil sump in the garage floor of the facility, which appeared to contain approximately 1/8 inch of petroleum product below the cover grate. GEI expects this waste oil sump discharges to the used oil UST outside the building. It appears that any flowable product poured or spilled to the grated floor sump would be conveyed to this UST. The floor drain and the presumed underground conveyance pipes are possible points of release of oil or hazardous material to the environment. To our knowledge, the waste oil UST is not a registered holding tank and as such the floor drain is not in compliance with NHDES Rule Env-Ws1508.02.

2.4.2 Remedial Status Summary

Based on analytical results for soil and groundwater at MA1 (Figure 3), there is evidence that a release of regulated product has occurred. The contaminated soils were encountered below the water table and at a location that is thought to be generally downgradient from site USTs.

The location of contaminated soils and groundwater and the nature of the contamination (alkyl benzenes, PAHs and TPH) are consistent with the use of site USTs for gasoline, used oil, and kerosene products storage.

GEI understands the owner is engaged in permanent closure of the USTs in accordance with NH Code of Administrative Rules Part Env-Wm 1401.

A site investigation (SI) will be required subsequent to excavation of the USTs and contaminated soils to determine the location and full extent of contamination and identify receptors and potential receptors. The SI must support a remedial action plan (RAP; Env-Ws 412.11 and Env-Wm 1403.08) for responding to and remediating the contamination while providing conditions protective of human health and the environment. Petroleum contaminated soils remaining after the USTs are removed from the ground, should be excavated, or treated to remove the source of continuing contamination to groundwater. Based on the municipal setting of the property, a presumed absence of drinking water wells in the area, and the anticipated development of the Parkway, GEI expects the RAP for the site will utilize a NHDES Groundwater Management Permit (GMP; Env-Wm 1403) to restrict use of the impacted groundwater and to monitor progress toward restoration of ambient groundwater quality. There is considerable evidence in environmental literature to suggest the overall processes of natural attenuation including intrinsic biodegradation may affect the restoration of petroleum-contaminated groundwater to performance standards in acceptable time. During any period of restoration, the impacted groundwater plume must be contained within a Groundwater Management Zone (GMZ), and the progress toward restoration monitored. The use of groundwater within the GMZ is restricted.

2.5 Barett & Gould

Barett and Gould, Inc. formerly operated industrial machine and metal workshops in a 1-story building with a basement located in the Nashua Millyard on Pine Street Extension (Figure 2). Barett & Gould, Inc. was a registered RCRA hazardous waste generator, EPA ID #NHD001084755. GEI's Phase II environmental investigation of the property was focused through prior work to the unpaved ground beneath a solvent fill pipe located on the southern wall the building. The fill pipe was the point of delivery of 1,1,1-trichloroethane (TCA; a cold solvent degreaser) to a 275-gallon storage tank formerly located on the ground floor level inside the building.

2.5.1 Prior Investigation Summary

On February 27, 1990, a soil boring with groundwater monitoring well installed (MW2) was drilled west of the Barett & Gould facility at the approximate location shown on Figure 4. The location was drilled to obtain groundwater quality information in the Millyard at an area identified with the historical industrial machining use of regulated hazardous materials (including heavy immiscible degreasing solvents). The 1990 soil boring was advanced to auger refusal at about 37 feet bgs and the monitoring well MW2 installed was screened to the bottom of the saturated overburden soils (the screen interval was set at approximately 27 to

37 feet bgs, with a depth to water measured in March 1990 of 31.6 feet bgs.). Groundwater was tested in March 1990 for Hazardous Substance List (HSL) VOCs and eight priority pollutant metals regulated by the Safe Drinking Water Act (SWDA). The results indicated low concentrations of TCA (2 µg/l) and carbon disulfide (2 µg/l) were present below AGQS. None of the eight inorganic metals tested for were detected in the sample.

In May 1991, the Barett & Gould commercial property was included in the scope of Phase III facility assessments performed by GEI to identify the types and quantities of hazardous or potentially hazardous materials and asbestos contained in buildings designated for possible demolition to construct the Parkway. These materials would require appropriate removal, disposal or treatment prior to demolition of the structures. The three most prevalent waste categories inventoried for this building were oil and grease, solvents, and cylinders of gases. The 1991 facility assessment identified the 275-gallon storage tank of TCA located on the first floor level inside the building. The fill pipe for this tank was constructed through the south wall of the building.

2.5.2 Preliminary Site Investigation Results

2.5.2.1 Hazardous Waste Manifests

Barett & Gould relocated their business out of the subject facility in August 1998. According to NHDES RCRA notification records for Barett & Gould Inc., a total of approximately 75 gallons of TCA and approximately 515 gallons of trichloroethene (TCE) were manifest from the facility in 1996 and 1998 as RCRA Part 261 Sub-Part D listed hazardous wastes from non-specific sources (spent halogenated solvents, waste codes F001 and F002).

2.5.2.2 Soil Test Results - 1998

Phase II environmental sampling performed by GEI in December 1998 included the collection of a surface soil sample from test pit TP135 (Appendix B), which was excavated in the fill in the vicinity of the solvent fill pipe (Figure 4). Analyzed for VOCs, the 1998 soil sample had low-level part per million (milligrams per kilogram; mg/kg) concentrations of TCE (0.07 mg/kg) and tetrachloroethene (PCE) (0.05 mg/kg). The results of analysis for this soil sample (1998 sample identification was "TP21" collected on December 18, 1998) are contained in EAI Laboratory Report #15250 provided in Volume II of this report. Table 5 contains a summary of the soil data.

The detected concentrations of PCE and TCE in surface soils in 1998 were 1 and 2 orders of magnitude, respectively, less than the NHDES RCMP Method 1 standards for Category NH S-1 soils. However their presence in surface soils suggested additional/deeper exploration of the subsurface for residual evidence of a release of chlorinated solvents was warranted.

2.5.2.3 Soil Boring with Monitoring Well Installed - 2001

Phase II environmental work performed by GEI in March 2001 included drilling one exploratory soil boring with monitoring well installed (BG1) in overburden soils south of the Barett & Gould building at the location of the solvent fill pipe (Figure 4). The boring log with monitoring well details for BG1 is provided in Appendix A. Boring BG1 was advanced to refusal using cased wash drilling and continuous split spoon sampling. Approximately 38 feet of overburden was observed at boring BG1. Upon reaching refusal, a 2-foot long rock core was drilled.

Eight feet of brown to black fill containing approximately 40 percent nonplastic fines and ash was encountered overlying narrowly graded, stratified native sands at BG1. Soil type changed from sands with about 5 percent fines to silty sands with approximately 40 percent nonplastic fines and increasing gravel content at about 33 feet bgs in BG1. Approximately 4 feet of silty sand and silty sand with gravel was encountered above bedrock.

The screen section of the monitoring well installed in BG1 extended from above the groundwater table to below the top of the silty sand. The depth to groundwater in BG1 was about 32 feet bgs when measured on March 28, 2001.

No detectable concentrations of TVOCs were measured during field PID-screening of soil samples. Soils recovered from 33 to 35 feet bgs (just below the estimated water table) were sampled for laboratory analysis of VOCs, PAHs, and TPH (Table 5). The results of analysis are contained in EAI Laboratory Report #25436 provided in Volume II of this report. No VOCs, PAHs, or TPH were detected.

2.5.2.4 Groundwater Quality

On March 28, 2001, three weeks after its installation, GEI collected a representative groundwater sample from BG1 for analysis of VOCs/8260B. The results of analysis are contained in EAI Laboratory Report #25674 provided in Volume II of this report.

TCA was detected in groundwater sampled from BG1 in March 2001 (Table 6) at a trace concentration of 2 µg/l. No other VOCs were detected in the groundwater sampled at BG1. The AGQS for TCA is 200 µg/l.

2.5.3 Remedial Status Summary

Groundwater monitoring well MW2 was installed to the west of the Barett & Gould building in 1990. Groundwater sampled from MW2 in March 1990 had 2 µg/l concentrations of TCA and carbon disulfide. In 1998, low-level concentrations of TCE and PCE in surface soil sampled near the solvent fill pipe suggested the possibility that chlorinated solvents might have been released to the ground here. Exploratory boring BG1 was advanced to test for further evidence of a release of solvent products. There was no evidence of VOCs present in field PID screening test results for soils sampled continuously during the drilling of BG1 to

about 37 feet bgs. There was no evidence of VOCs, PAHs, or TPH detected in laboratory tests of soils obtained from the approximate depth of the water table at BG1.

Groundwater from monitoring well BG1 was sampled in March 2001 for VOCs. A trace level concentration of TCA (2 µg/l) was detected. This is the same trace concentration of TCA detected in 1990 (11 years prior) in a sample of groundwater from MW2 located on the west side of the facility. GEI infers regional groundwater flow is to the west or northwest toward the Falls Park wetland or Nashua River. In this case, BG1 would be cross gradient or upgradient of MW2.

The low level concentrations of PCE, TCE, TCA, and carbon disulfide detected in surface soil or groundwater on the Barett & Gould property do not present an adverse risk of harm to human health or the environment based on NHDES RCMP Method 1 risk assessment standards. The detected concentrations of contaminants in environmental media at the Barett & Gould site are not actionable.

Throughout much of the Millyard there is poor fill containing ash, cinders, or slag as described in Section 2.8. Poor fill containing ash is present on the Barett & Gould property. Noting the possible exception of the poor fill present on the property, there are no known actionable subsurface environmental conditions on the Barett & Gould property.

2.6 Nashua Industrial Machine Corporation (NIMCo)

NIMCo (now Ultima Machine Company) is an active industrial manufacturer occupying a 2-story building with a partial basement located in the Nashua Millyard on Pine Street Extension (Figure 2). NIMCo is registered as an active RCRA small quantity hazardous waste generator, EPA ID #NHD001083492. A review of NHDES RCRA notification and manifest records indicates for the period from March 1994 through July 1997, NIMCo manifest approximately 10, 900 gallons of waste oil from its facility. Waste oil manifest quantities ranged from 450 gallons to 3,300 gallons and in all cases the oil manifest was transported off-site by tank truck. Property reconnaissance performed in 2001 found one 275-gallon waste oil above ground storage tank (AST) located outside the NIMCo building along its south wall and a drum storage area located outside the building at its northwest corner (Figure 5). Waste oil quantities manifest by NIMCo may have been pumped from the AST and/or the drummed waste. At least three other 275-gallon ASTs were present inside the building during a facility audit conducted by GEI in 1991. The three interior 275-gallon ASTs were described in 1991 to contain coolant. GEI understands that two of the interior ASTs are in current use for heating oil storage.

City of Nashua records indicate a permit was issued in September 1983 to NIMCo for installation of a 4,000-gallon fuel oil UST. The UST was registered with the NHDES in 1986 (Facility ID #0110419) and permanently closed by removal from the ground in December 1998. The 1998 UST closure did not result in a listing of the property and it is presumed there was no indication of a release of fuel oil in the excavation. As previously

noted, oil for heating the facility is now stored in two of the interior 275-gallon ASTs observed in 1991.

2.6.1 1991 Test Pitting Results

In November 1991, test pit TP110 (Figure 2) was excavated in fill on the north side of the NIMCo building to a depth of 4 feet bgs. Ash, cinder and brick were observed in the fill. Soil was collected at 4 feet bgs (TP110-4) for analysis of VOCs, acid-base/neutral extractable semivolatile organic compounds (ABNs), TPH, polychlorinated biphenyls (PCBs), and RCRA-8 total and toxic characteristic leaching procedure (TCLP) metals. This work was reported by GEI in 1992.

The concentrations of TCE, arsenic, and six carcinogenic PAH compounds (cPAHs) detected in the fill at location TP110 in 1991 exceed current RCMP NH S-1 soil standards. The 1991 concentrations for TCE, arsenic and benzo[a]pyrene exceed current RCMP Method 1 NH S-3 soil standards for possible adverse risk of harm. Current applicable RCMP Upper Concentration Limits in soil (UCLs) were not exceeded.

TP110 – fill at the center north-wall of the NIMCo building @ 4 feet bgs		
Analyte Exceeding NH S-3 Risk Standard	Soil Result	RCMP NH S-3 Standard
Trichloroethene (TCE)	1.9 mg/kg	0.8 mg/kg
Arsenic	12.6 mg/kg	11 mg/kg
Benzo[a]pyrene	12.5 mg/kg	4 mg/kg

2.6.2 Phase II Environmental Assessment Results

The scope of work for Phase II environmental assessment of the NIMCo property included:

1. Excavation and sampling of shallow test pit TP136 in fill to the west of the NIMCo building.
2. Drilling and sampling of soil boring N1 to the west of the NIMCo building and installation of a monitoring well.
3. Collection of five (5) surface soil samples from various areas including the perimeter of the drum storage pad (3), the former UST fill pipe (1), and the existing waste oil AST (1). A hand auger was used for sample collection.

2.6.2.1 Test Pit TP136

In December 1998, GEI excavated shallow test pit TP136 to a depth of 1.5 feet bgs in fill west of the NIMCo building (Figure 5; Appendix B). The fill at the location consisted of gray/black sand with gravel containing brick fragments. Soil from TP136 was collected for analysis of VOCs, PAHs, and TPH. The results of the analyses for this sample (1998 sample identification "TP22" collected on December 16, 1998) are contained in EAI Laboratory Report #15250 provided in Volume II of this report. A summary of the chemical testing results for shallow soil sample TP136 is provided in Table 7.

No VOCs, and a low level of TPH (180 mg/kg) were detected in shallow soils from TP136. Nearly all PAH target analytes were detectable in the sample, and the concentrations of three (3) carcinogenic PAH compounds exceeded RCMP NH S-1 soil standards (Table 7).

2.6.2.2 Soil Boring with Monitoring Well N1

GEI observed the drilling of soil boring with installed monitoring well N1 west of the NIMCo building on March 5, 2001 (Figure 5; Appendix A). Boring N1 was advanced to a depth of 22 feet bgs. Split spoon sampling was performed at approximate 5-foot intervals in the boring. Soil headspace PID-screening tests for VOCs were performed on split spoon samples obtained from the boring.

The upper 8 feet of soil encountered was observed to consist of brown to black silty sand with about 30 percent nonplastic fines and ash. Below the fill, stratified, native silt with sand and silty sand was observed to approximately 18 feet bgs. Widely graded sand with silt and gravel was observed from approximately 18 to 22 feet bgs. Groundwater was encountered in boring N1 at about 11 feet bgs. Monitoring well N1 was installed with the screen section extending from 10 to 20 feet bgs.

There was no indication from field PID screening tests of VOC contamination in the boring. Soils recovered at about the groundwater table from 10 feet to 12 feet bgs were sampled for analysis of VOCs, PAHs, and TPH. The results of the analyses are contained in EAI Laboratory Report #25436 provided in Volume II of this report. The native silty sands sampled from 10 to 12 feet bgs in N1 were found free of detectable concentrations of VOCs, PAHs, and TPH. A summary of the analytical results is provided in Table 7.

2.6.2.2 Groundwater Quality

Shallow groundwater in native soils below fill on the NIMCo property at location N1 (Figure 5) was sampled on March 28, 2001 for analysis of VOCs and SVOCs. The results of analysis are contained in EAI Laboratory Report #25647 provided in Volume II of this report. The groundwater sample contained concentrations of 2-butanone (MEK; a VOC) and bis (2-ethylhexyl) phthalate (BEHP; a SVOC) at concentrations slightly greater than the AGQS. A summary of the analytes detected in groundwater at N1 is provided in Table 8 with comparisons to AGQS.

The water table elevation observed in N1 was judged to be similar to the surface water level observed in the Nashua River some 50 feet to the west. Groundwater in the vicinity of N1 is inferred to flow generally to the west, discharging to the Nashua River.

2.6.2.3 Spill Targeted Surface Soil Sampling - 2001

Surface soil samples were collected by GEI with a hand auger from approximately 0 to 1 foot bgs at five locations on the NIMCo property on April 25, 2001. Sampling locations were selected to test for evidence of OHM spilled to the ground from the drummed waste storage pad and outdoor 275-gallon waste oil AST (Figure 5). The drummed waste storage pad was

constructed with cover from the weather, but the roof was in disrepair in 2001. The waste oil AST is in a concrete berm structure, but the containment structure was cracked, prominently in one corner.

All five surface soil samples were gray/brown sand fill. Small patches of stained soils were observed but not targeted for sampling. Soil sample SS-1 was collected beneath a fuel oil fill pipe constructed in the exterior wall of building outside the boiler room. Surface soil samples SS-2 through SS-4 were collected at locations along the perimeter of the concrete pad used for drum storage. Surface soil sample WO-1 was collected just outside the damaged corner of the concrete berm containing the exterior 275-gallon waste oil AST. The surface soil samples were submitted to EAI in April 2001 for analysis of VOCs, SVOCs, and TPH. The results of analysis are contained in EAI Laboratory Report #26060 provided in Volume II of this report. A summary of the analytes detected in the surface soils is included in Table 7 with comparisons to RCMP soil standards. The results are discussed below.

- Soil at location SS-3 by the southwest corner of the drum storage area contained a concentration of 2-butanone (MEK; 3.9 mg/kg) that exceeded the RCMP standard for NH soils. The RCMP NH S-1, S-2 and S-3 standard for MEK is 2 mg/kg. Recall that MEK was found in groundwater at N1 (nearby SS-3) at a concentration exceeding AGQS. Five other Method 8260B VOCs were detected in some of the surface soil samples, but at concentrations below the NH S-1 soil standards.
- Consistent with the results for surface soils obtained from TP136 in 1998 (Figure 5; Table 7), surface soil samples SS-1, SS-3, and SS-4 contained concentrations of cPAHs that exceed RCMP Method 1 NH S-1 soil standards. Six (6) cPAHs were detected in common in surface soils at SS-3 and SS-4 at concentrations exceeding NH S-1 soil standards (Table 7). The concentration of benzo[a]pyrene exceeded its NH S-3 soil standard in surface soils at both locations. The concentration of dibenz[a,h]anthracene (3.1 mg/kg) found in surface soil at location SS-4 is approaching the NH S-3 soil standard of 4 mg/kg.
- UCLs for detected analytes, including the cPAHs were not exceeded in the surface soil results.
- The concentrations of total petroleum hydrocarbons (TPH) in all the shallow soil samples were less than the RCMP NH S-1, S-2, and S-3 soil standard. The highest concentration of TPH found was 3,200 mg/kg in the sample associated with the waste oil AST (WO-1). The RCMP soil standard for TPH is 10,000 mg/kg.

2.6.3 Remedial Status Summary

Actionable levels of MEK and cPAHs impact the shallow soils (0 – 1.5 feet bgs) situated between the former NIMCo facility and Nashua River. The concentrations of two cPAHs and MEK exceed or approach their category NH S-3 soil standards. Based on an RCMP Method 1 risk assessment, these accessible soils pose an adverse risk of harm.

Much of the fill present on the NIMCo property contains ash and cinders associated with elevated concentrations of cPAHs. Limited data indicate native soils and groundwater underlying the fill are not adversely impacted by the PAH content of the overlying poor fill.

However, groundwater beneath the property at monitoring well N1 is evidently contaminated with relatively low-levels of MEK and BEHP. The extent of the source of these more soluble contaminants is not certain. However the nearby surface soil grab sample at location SS-3 had an elevated concentration of MEK in the April 2001 results.

Possible contributing sources of PAH-contamination in soil may include the ash and slag material present in the poor fill, uncontrolled releases of waste oil managed at the NIMCo drum storage area (during handling, storage or transfer), or overfill spillage of fuel oil during deliveries. A possible source of MEK and BEHP impacts to groundwater at N1 may be an uncontrolled spill or release of industrial waste (e.g., solvent or adhesive wastes) from the drum storage area. The uncontrolled releases of OHM indicated in shallow soil test results may have been chronic or episodic. The results of the Phase II environmental scope of work suggest additional soil borings with monitoring wells installed are needed to delineate the lateral and vertical extent of contamination in soil and groundwater at NIMCO.

In addition to issues at the western end of the NIMCo facility, 1991 results for test pitting performed along the north wall of the facility (TP110; Figure 2) found elevated concentrations of TCE, cPAHs, and arsenic in fill sampled from 4 feet below grade.

The extent of impacts to groundwater at the NIMCo facility is not well known. Analytical results for one sample of groundwater from N1 indicates there are relatively low-levels of soluble MEK and BEHP contamination. It is not expected that surface water quality in the Nashua River would be measurably impacted by the concentrations of MEK and BEHP as found in upgradient groundwater at N1.

Limited data for PAH compounds in groundwater beneath ash and slag contaminated Millyard fill suggest the PAH component of the poor fill is not migrating in aqueous phase to groundwater with adverse impacts to groundwater quality. Based on the limited data, when detected in groundwater in the Millyard the concentrations of PAHs today are less than AGQS.

A RAP for the NIMCo property must be developed to provide for conditions protective of human health and the environment. This RAP may incorporate institutional control of soil and groundwater risks of harm through AUR and the GMP program, respectively.

With the concentrations of contaminants below Upper Concentration Limits (UCLs) for soils as defined in the RCMP, the NHDES may allow the soil to remain in place provided harmful exposures to the contaminated soils could be prevented. Present design of the Parkway has the boat ramp access road constructed directly over the drum storage pad and contaminated soils currently situated between the western end of existing NIMCo facility and the Nashua River (Figure 2). Based on current design plans, construction of the access road and the Parkway by TP110 will require raising the existing grade. Isolating any contaminated soils under clean fill or roadway, with land uses administratively controlled by AUR, may adequately remove the contact risks of exposures to MEK, BEHP, TCE, PAHs or arsenic.

Grade changes (filling), roadway construction and storm water management for the Parkway may also be expected to reduce infiltration of water through the contaminated media and attenuate the mobilization of contaminants to groundwater. With the proposed roadway constructed, GEI expects a GMP will be an adequate RAP for groundwater contamination at the NIMCo site. The GMP will provide monitoring for progress toward groundwater quality restoration. The GMZ will restrict use of the contaminated groundwater.

The installation of additional groundwater monitoring wells and the establishment of surface water monitoring stations will be required to support a GMZ and provide adequate monitoring. We expect two additional downgradient wells and one additional upgradient well will be needed to develop and monitor a proposed GMZ.

AUR and GMP would provide reasonable assurance that conditions protective of harm are maintained for as long as needed. The AUR and /or GMP may be developed as site-specific RAP elements or as elements to a single Parkway-wide RAP.

At this time, two additional soil borings with monitoring wells installed are needed hydrologically flanking the impacted formation at N1. Additionally, an upgradient groundwater monitoring location should be established.

2.7 W. H. Bagshaw Company, Inc. Lagoons

Established in 1870, the W. H. Bagshaw Company, Inc. (Bagshaw Co.) may be the oldest pin manufacturer in the United States. Bagshaw Co. manufacturers pins, pin assemblies and wire products today from a two-story building located in the Nashua Millyard at 1 Pine Street (Figure 2). Manufacturing operations performed by Bagshaw Co. include barrel tumbling steel pins using sand, stones, and sawdust with #2 fuel oil (diesel). Process wastes include oil/water and oily sludge wastes. The Bagshaw Co. is a registered full quantity generator of regulated wastes, EPA ID #NHD001081231. Based on information contained in NHDES' records, the Bagshaw Co. manifest in 2001 approximately 200 gallons of petroleum naphtha waste (toxicity characteristic waste code D039) and approximately 1,650 gallons of waste oil destined for recycling in Massachusetts (state-regulated waste code MA98). In 2000, records indicated about 230 gallons of petroleum naphtha (D039) and 5,225 gallons of waste oil and water (MA98) were manifest. The waste oil manifests for recycling in 2001/2000 ranged from 700 gallons to 2,875 gallons per manifest. GEI understands the light #2 oil waste from tumbling operations is skimmed from the facility's wastewater treatment system and drummed until sufficient quantity has accumulated for manifest. The drummed waste is siphoned or pumped (by Clean Harbors) to a tank truck for transport to the recycling facility.

For an uncertain period of time prior to 1987, process oil and water wastes were discharged to unlined wastewater settling lagoons for treatment. Two lagoons were constructed in series on the property to receive the oily, sludgy wastewater. Environmental conditions relative to the former unlined wastewater lagoons were the focus of Phase II work at this property.

The Bagshaw Co. is registered as NHDES Underground Storage Tank (UST) Facility #0111794. The facility has one 10,000-gallon #2 heating oil UST, installed in 1982 and in current use.

2.7.1 Lagoons Closure

The reported location of the Bagshaw Lagoons was estimated by GEI to fall directly beneath the proposed Parkway alignment in the Millyard. For this reason, it was important to understand the environmental and geotechnical implications of the measures taken to close the lagoons. The following text summarizes GEI's review and investigation of the Bagshaw Lagoons closure.

2.7.1.1 NHDES File Review

The Bagshaw Co. is NHDES listed as closed Remediation Site Project #198406027 (Project type - unlined wastewater lagoons). In April 2001, GEI requested to review NHDES files pertaining to the Bagshaw Co. lagoons. The following information is based largely on what was found in the material available for GEI's review.

The NHDES Bureau of Solid Waste Management (BSWM) was notified of the Bagshaw Co.'s practice of land disposal of process oil and water sludge waste in July 1980. An oily water and sludge waste was apparently discharged without prior approval or permit to unlined lagoons constructed on the property for waste treatment (Figure 4). The treatment process consisted of separation of the organic-rich oily and greasy solids, which would settle by gravity to the bottom of the lagoons, from the light immiscible #2 oil fractions, which would float to the surface of the primary receiving impoundment. The light oil and water phase was skimmed or evaporated from the surface of the lagoons. The bottom sludge would be expected to undergo biological treatment to some extent by naturally occurring hydrocarbon-degrading microbes. Water would to some extent infiltrate into the ground below the unlined lagoons.

In correspondence dated September 28, 1983, the NHDES BSWM approved a request made by the Bagshaw Co. to dispose of dewatered sludge from the wastewater lagoons to the Nashua Landfill. In the letter the NHDES notified the Bagshaw Co. of its legal obligation to obtain a Groundwater Discharge Permit (GDP) for use of the lagoons from the NHDES Groundwater Permit Division. In October 1983 the NHDES received a GDP application and in response requested composite analysis of the discharge to support the GDP application. No record of its issue or reports of monitoring under a GDP were observed by GEI in the file material. The GDP may or may not have been issued after October 1983 and prior to the cessation of lagoons use by Bagshaw Co. in 1987.

By November 1987, the Bagshaw Co. was engaged in the process of closing its lagoons. A report titled Hydrogeologic Investigation and Waste Characterization Studies for Closure of Wastewater Lagoons was prepared for the Bagshaw Co. by Donald H. Bruehl, C.P.G. in October 1989. Work performed included groundwater monitoring, and sludge/wastewater waste characterization sampling.

In April 1989, three monitoring wells were installed to investigate possible impacts to groundwater quality from the unlined lagoons. The wells were located to evaluate groundwater quality upgradient and downgradient of the lagoons. Groundwater was sampled in May and June 1989 for dissolved RCRA 8 metals and Method 624 VOCs. The results of the groundwater analyses are summarized below.

- Dissolved metals were either not detected or were detected at concentrations less than AGQS in groundwater in the area of the lagoons. Arsenic was the only metal detected more than once in the six samples of groundwater tested for dissolved metals in 1989. Arsenic was present in groundwater upgradient from the lagoons.
- One sample of groundwater collected in June 1989 downgradient from the lagoons had replicated concentrations of trichloroethene (TCE; 81 and 76 µg/l) in excess of AGQS. (5 µg/l). The source of the TCE is unclear. TCE was not identified as a contaminant of the #2 oil/water waste or sludge.

In July 1989, composite samples of the sludge and of the lagoon wastewater were collected for waste characterization analyses. The results are summarized below.

- The composite sample of the lagoon sludge had an approximate concentration of oil and grease (EPA Method 413.1) of 3,600 parts per million (ppm), elevated biological and chemical oxygen demands (BOD5 and COD), a cyanide concentration of 1.76 ppm, and a sulfide concentration of 66.1 ppm. No other characteristics of toxicity were positively indicated in the results for the sludge (which included tests for VOCs, extract procedure (EP) toxicity for RCRA 8 metals plus copper and zinc, PCBs, and pesticides).
- The composite sample of the lagoon wastewater had a concentration of oil and grease of 193 ppm. The sample had a dissolved concentration of arsenic (0.08 ppm) in excess of AGQS (0.050 ppm). No other characteristics of toxicity were positively indicated in the results for the lagoon wastewater.

The 1989 Bruehl report concluded solute and water migration from the lagoons was expected to be very low due to the limitation of a fine-grained, low permeability sludge boundary at the bottom of the lagoons. The lagoons are described as perched hydrologic features with water levels largely regulated by evaporation. The discharge boundary for groundwater is the Nashua River (approximately 250 feet from the lagoons). There are no known water supply wells in the vicinity of the lagoons, or between the lagoons and the river.

Based in part on anticipated land development by the Bagshaw Co., recommendations were made in the 1989 Bruehl report to close the lagoons by pumping off the free water for on-site treatment and discharge to the Nashua POTW, and excavating the sludge. Excavated sludge would be contained and dewatered, and eventually disposed of off-site. Confirmation testing of the soils left in situ would be performed for NHDES-approved closure of the lagoons and backfilling.

In review correspondence dated November 8, 1989, the NHDES generally accepted the report and its recommendations, with a request for re-sampling of groundwater for TCE and sludge for cyanide. The NHDES requested a letter of commitment by the Bagshaw Co. and an anticipated schedule for implementing the lagoons closure. The NHDES again (as in 1983) indicated a groundwater permit would be required for the site.

2.7.1.2 NHDES Unlined Lagoon Project Closure

On December 4, 1989, the Bagshaw Co. wrote to the NHDES indicating a commitment to implement completely the recommended lagoon closure. However, no lagoon closure report (after excavation of sludge), confirmation soil sampling results, or correspondence regarding closure activity was found in the NHDES file material provided. In October 1991 the Bagshaw Co. wrote to the NHDES Water Supply and Pollution Control Division providing "copies of the analytical results of voluntary *post-closure* testing of the monitoring wells at the location." The lagoons were evidently closed prior to October 1991. There was no record of how the lagoons were actually closed in the file material provided to GEI in 2001.

As recently as July 27, 1998 the NHDES was requesting information from the Bagshaw Co. regarding the closure of the lagoons. In the record of a telephone conversation on this date with the Bagshaw Co., the NHDES indicates an uncertainty about whether the lagoon "material was left in place or removed" and if it was removed, "where did it go?" On March 3, 1999 the NHDES requested from Bagshaw Co. a written recollection, "to the best of your ability," regarding the closure method for the lagoons and the disposal location of the materials removed from the lagoons.

By April 1999, the NHDES Water Division had received as requested from the Bagshaw Co. the monitoring well analytical data collected between 1989 and 1999. Based on its review of the groundwater monitoring data submitted and information obtained during a site inspection performed in 1999, the NHDES concluded that all previous requirements relative to the unlined lagoons had been adequately addressed, that no known sources of groundwater contamination remain at the site, and that AGQS has been repeatedly met for all monitoring wells at the site. The NHDES regulatory file for the site was closed on August 11, 1999.

2.7.2 Test Pitting - 1990

In 1990 Phase II environmental work, GEI located TP8 to investigate possible impacts from the lagoons in soils approximately 50 feet to the north of the lagoons (Figure 4). The test pit was excavated to a depth of 9 feet with no indication in field screening tests of VOC-contamination in the fill or native soils. At TP8 approximately 4.5 feet of fill was found overlaying native widely graded sand with gravel (Appendix B). The fill was typical of the Millyard, described as brown to black in color, with a significant amount (20%) of non-plastic fines, and brick fragments. A sample from the fill at 3 feet bgs was tested for 1990 Hazardous Substance List VOCs (HSL/VOCs). No VOCs were found in the sample.

2.7.3 Test Pitting - 2001

Due to uncertainty regarding the removal of sludge from the lagoons, GEI excavated two test pits at the location of the former Bagshaw Co. wastewater lagoons. In April 2001 based on citing information provided by the owner's representative, GEI observed the excavation of test pits TP208 and TP209 to depths of approximately 16 feet bgs at locations within the footprints of the former Bagshaw Co. wastewater lagoons (Figure 4; Appendix B). The soils encountered during test pitting were described and soil samples submitted for laboratory analysis based on field screening results for VOCs.

In both test pits, an approximately 1-foot thick deposit of dry, black fine-grained material was observed underlying a cover of about 5-feet of fill. The black fine grained material was found in both test pits at an elevation of about 143 to 144 feet NGVD (National Geodetic Vertical Datum). Based on the *Geologic Cross Section* presented in Figure 4 of the 1989 Bruehl Report, elevation 140 feet NGVD is about mid-way up the diagramed sidewalls of former wastewater lagoon #2.

The average measured sludge thickness in the larger of the two lagoons reported in the 1989 Bruehl Report was 1.08 feet. Both the elevation and thickness of the black material described in GEI test pits TP208 and TP209 suggest a possible association with the former Bagshaw lagoon sludge or sludge-impacted soils. A slightly elevated soil PID-screening result of 7.2 ppm of TVOCs was found in TP208 just below the black horizon. Groundwater was not encountered during the test pit explorations to depths of 16 or 17 feet bgs. Native sands with gravel were found below the black silt-sized deposit to termination depths in both test pits.

The existing fill overlying the black deposit found in the area of the former sludge lagoons is light brown to brown narrowly graded fine to medium sand, with about 10 percent nonplastic fines and occasional brick fragments, light brown to brown in color. The Bagshaw Co. representative on-site during test pitting indicated the backfill used for site restoration after the lagoon sludge was excavated for closure, was material available in the Millyard reportedly from roadway and parking lot sweepings.

Two soil samples from a depth of about 6 feet bgs in TP208 were submitted for analysis of VOCs, ABNs, RCRA 8 metals, TPH, and total cyanide. The results for these analyses are contained in EAI Laboratory Report #25987 provided in Volume II of this report. A summary of the results is provided in Table 9 with comparison to RCMP soil standards. The results are discussed below.

- The two samples of the black fine grained material obtained from TP208 contain detectable concentrations of many semivolatile organic compounds, predominately PAH compounds within the diesel fuel range. Between the two samples, three cPAHs were detected at concentrations exceeding Method 1 risk standards for category NH S-1 soils.
- The concentrations of benzo[a]anthracene were found equal to or greater than the category NH S-1 soil standard in both samples.

- No PAH result in either sample exceeded the RCMP category NH S-3 soil standards, but the concentration of benzo[a]pyrene (3.4 mg/kg) approached its NH S-3 soil standard (4 mg/kg).
- The concentration of arsenic in one of two samples of the black material (12 mg/kg) was equal to the RCMP soil standard (the arsenic in soil standard is the same for category NH S-1, S-2 and S-3 soils).
- In VOC results, only a trace concentration of 1,1,1-trichloroethane (TCA) was detected in one sample of the black material.
- The material was free of total cyanide, and had relatively low levels of TPH.

2.7.4 Remedial Status Summary

The former unlined wastewater lagoons were closed around 1990. Closure reportedly included excavation of accumulated sludge and impacted soils from the lagoons with disposal of the excavated material to the Nashua Landfill. Based on a summary review of their project file, the NHDES closed the Bagshaw unlined lagoons project in August 1999. Groundwater at the site as indicated by the NHDES verifiably meets AGQS.

GEI's 2001 test pit investigation identified an approximately 1-foot thick layer of dry, black fine grained material within the footprint and elevation of the former lagoons. The material sampled contained concentrations of carcinogenic PAHs (Table 9) that exceed or equal the most conservative RCMP Method 1 soil standards for risk of harm characterization, category NH S-1 soil standards. Samples of the black material were found to contain concentrations of inorganic arsenic that just exceeded or approached the single RCMP NH soil standard for arsenic.

The black fine grained deposit was encountered about 5 feet below existing grade and perhaps as much as 20 feet above the groundwater table. The material has not adversely impacted groundwater quality based on monitoring results reviewed by the NHDES. The depth of burial and the industrial land use suggest the material in situ poses little risk of harm through contact exposure pathways. Current design of the Parkway indicates there is not a grade change at the location of the former lagoons. The black fine grained material is not expected to be disturbed by the Parkway's construction. Further, the Parkway in currently proposed alignment may cover completely the area of the former lagoons (Figure 2; TP208 and TP209).

A RAP must provide for containment of the black fine grained material in place (Parkway construction). AUR will be necessary to avoid future disturbance of the material that could result in contact exposure. An individual AUR could be developed for the lagoon site or the site could be included in Parkway-wide AUR. We do not expect that the RAP need include groundwater monitoring.

2.8 Millyard Fill

Environmental and geotechnical subsurface explorations performed in the historic Millyard (Figure 2; Appendices A and B) indicate widespread presence of fill above native soils, ranging up to tens of feet in thickness at places. The Millyard sand fill was found generally to be a brown or black granular soil with varying amounts of nonplastic fines and ash, cinder or slag. Brick fragments and other construction and demolition (C&D) solid wastes were found in the fill at some locations. Based on the results of polarized light microscopy (PLM) analysis, asbestos containing materials were generally not found in the Millyard fill. ACBM/ACM was found on the ground and in shallow fill near the Boiler Building.

Samples of the fill were submitted for chemical analyses as part of our evaluation of specific areas of the Millyard. Samples of the fill were analyzed from borings BG1 and N1, test pits TP8, TP110, TP136, and TP208. Based on analytical results that included tests for VOCs, SVOCs, TPH, metals, and to a limited extent pesticides and PCBs, the principal risk of chemical (toxic) harm associated with the Millyard fill is from PAH content attributed to the ash, cinder, or slag material in the matrix. The ash, cinder or slag component of the fill may be in aggregate form or it may be pulverized to fine particle grain sizes. Results of bulk analysis of the Millyard fill indicate the fossil fuel combustion products may contain measurable and problematic concentrations of the four, five and six ring polynuclear aromatic hydrocarbons considered to be probable human carcinogens (the cPAHs). The cPAH compound group includes the following four compounds with relatively low threshold concentrations for potential risk of harm based on cancer potency factors calculated by the EPA.

benzo[a]anthracene	dibenzo[a,h]anthracene
benzo[a]pyrene	indeno[1,2,3-cd]pyrene

The NHDES RCMP Method 1 risk characterization standard for these cPAHs in category NH S-1 soils is 0.7 mg/kg.

2.8.1 Sample HA-1

To further assess both the environmental and waste disposal characteristics of the described ash contaminated sand fill distributed widely in the Millyard, GEI obtained a hand-augered sample at location HA-1 on the Barett & Gould property (Figures 2 and 4). Nearby test pit TP256 excavated in April 2001 had revealed a 6-foot thick deposit of sand fill containing ash and slag south of the Barett & Gould building. GEI returned in May 2001 to collect the hand-augered sample HA-1. HA-1 was composited in the field with fill recovered from 0 to 6 feet bgs. The composite sample was submitted for Table IV waste characterization analyses, which included: VOCs/8260B; ABNs/8270C; TPH/8100 modified; pesticides and PCBs/8081A-8082; herbicides/8151; toxic characteristic leaching procedure (TCLP) RCRA 8 metals/6020; chloride/325.2; alkalinity/310.1; specific conductance/120.1; ignitability/7.1.2; corrosivity/9045; reactive cyanide/7.3.3.2, and; reactive sulfide/7.3.4.2. EAI Laboratory Report #26390 contains the results of analyses performed on hand-auger

sample HA-1 and is provided in Volume II of this report. The results for analytes detected in the composite of fill at HA-1 are summarized in Table 5 and discussed below.

- VOCs, TPH, PCBs, pesticides, herbicides, leachable metals, reactive cyanide or reactive sulfide were not detected in the sample.
- Many semivolatile organic compounds (SVOCs including 14 PAH/cPAH compounds) were detected in the fill sample at relatively at relatively low concentrations. **Benzo[a]anthracene and benzo[a]pyrene** were detected in the sample HA-1 at concentrations roughly equal to the category NH S-1 soil standard of 0.7 mg/kg. All other SVOC concentrations were below the NH S-1 standards.

GEI re-submitted for total metal analysis a sample of the HA-1 composite collected from bulk sample material maintained by GEI. This material was out of holding time for metals when submitted for analysis. However, the sample integrity of the stored bulk material was certain and with the exception of mercury, GEI expects the total inorganic metal element concentrations of the bulk solid material to be qualitatively representative of the material when it was sampled. The ash contaminated fill contained no detectable RCRA 8 total metal concentrations.

2.8.2 Millyard Fill Remedial Status Summary

As indicated in the previous section, cPAH concentrations in the existing Millyard fill exceed applicable RCMP soil standards for accessible or potentially accessible soils, and the development of a Remedial Action Plan (RAP) for review and approval by the NHDES will be required. However, since the concentrations are below the Upper Concentration Limits (UCLs) defined in the RCMP, the NHDES may allow the Millyard fill to remain in place provided it is contained beneath clean soils and rendered inaccessible to contact and inhalation exposures. At this time, we expect that the RAP will include leaving the soils in place beneath either the roadway or a layer (working estimate of about 2 feet thick) of clean soil, placement of contaminated soils that are excavated beneath clean soil cover, off site disposal of surplus soils generated by Parkway construction at a permitted solid waste landfill, and the preparation of Activity Use Restrictions (AUR) to avoid uncontrolled exposures to the contaminated soils in the future.

Construction of the Parkway in the Millyard is likely to generate surplus Millyard fill soils that will require off-site disposal. Potential sources of surplus Millyard fill soils include the following:

- Road base construction: The proposed Parkway alignment within the Millyard will be constructed at approximately the existing grade. Existing fill soils will be removed to accommodate the placement of the roadway base soils.
- Utility trenches: Millyard fill soils excavated for placement of storm drainage and other underground utilities should be suitable for use as trench backfill as long as clean soil is placed at the surface for containment. However, due to the placement of

the utility, bedding, and clean soils at the surface, surplus Millyard fill soils will likely be generated by trench excavation.

- Retaining wall construction: The current plans for the Parkway include the construction of a retaining wall along the Cove area. Geotechnical explorations in the area of the proposed wall have encountered a thick layer of the Millyard fill. Wall types currently being considered include a mechanically stabilized earth (MSE) wall and a permanent sheetpile wall with a concrete facing. If the MSE wall is selected, we would propose to re-use the existing Millyard fill soil within the geogrid-reinforced zone behind the wall. If a sheetpile wall is selected, we would propose to leave the existing Millyard fill in place beneath clean fill. Surplus Millyard fill soils will probably be generated by wall construction.
- Site grading and restoration.

2.9 Nashua River Bridge Crossing

Prior GEI investigations (GEI 1990 and GEI 1992) identified two areas of environmental concern on the alignment for the Nashua River Bridge crossing the Nashua River. The concerns were in regard to asbestos in soils north of the river crossing (TP 101; Figure 2), and asbestos and petroleum in soil south of the river crossing in the area of the former 420,000-gallon fuel oil AST.

Two additional issues of potential environmental concern for construction of the bridge crossing the Nashua River were identified from the results of environmental sampling performed by GEI in October 1998. An elevated concentration of arsenic was found in riverbed sediments at the bridge crossing and cPAHs were detected in soils north of the river crossing (B807; Figure 2). Much of the following material was reported in GEI's *Design Memorandum on Subsurface Conditions and Foundation Design Recommendations for the Nashua River Bridge* dated August 20, 1999.

2.9.1 Subsurface Explorations in 1998

Eighteen (18) soil borings, (B801 through B818) were drilled with the proposed Nashua River Bridge alignment between October 14 and December 8, 1998. The boring locations are shown on Figure 2. Exploratory boring depths ranged from 5 to 85 feet. Split-spoon soil samples with Standard Penetration Tests (SPT) were obtained at approximate intervals of 5 feet. Borings B803 through B806 were drilled from a barge on the Nashua River. Groundwater observation wells were installed in B809 1and B815 to depths of 35.5 and 37.8 feet, respectively. Boring logs (with well construction data) are provided in Appendix A.

All 18 soil borings were sampled for asbestos. Eight of the soil borings (B801, B802, B807, B809, B812, B813, B815, B818) were sampled for environmental analyses including VOCs/8260B, PAHs/8270C, TPH/8100 modified, and PCBs/8082. One composite sample of shallow sediments in the Nashua River was analyzed for waste characterization Table IV analyses.

2.9.2 Alignment North of the Nashua River

2.9.2.1 Asbestos

1998 soil borings B807 through B818 were advanced in the proposed alignment for the Nashua River Bridge along the north bank of the river (Figure 2). Each boring was sampled for the presence of asbestos in the subsurface. No asbestos was detected in soil samples analyzed from B807, and B809 through B818 in the north alignment of the bridge. At B808, PLM-analysis of surface soil (0 – 2 feet bgs) indicated bulk asbestos content in the sample of 2 percent Chrysotile asbestos. Investigations performed in 1992 in the north alignment for the bridge found asbestos tile on the ground at test pit TP101 and asbestos cement board on the ground at test pit TP102.

2.9.2.2 VOCs, PAHs, TPH, and PCBs

Soils from 1998 borings B807, B809, B812, B813, B815, and B818 drilled along the proposed alignment of the Nashua River Bridge north of the river were sampled for analysis of VOCs, PAHs and TPH. Soil from B809 near the Nashua Corporation property was analyzed for the additional parameter of PCBs. The results of analyses performed are contained in EAI Laboratory Reports #14476, #14570, #14780, and 15071 provided in Volume II of this report.

The soils sampled from B809, B812, B813, B815, and B818 were found to be free of reportable concentrations of VOCs, PAHs, TPH, and PCBs.

Sand and silt fill was encountered at B807 to a depth of 14 feet bgs. Soil sampled from 5 to 7 feet bgs in the fill had no detectable VOCs, a low concentration of TPH (90 mg/kg), and generally low concentrations of PAHs. However, the cPAHs benzo[a]anthracene and benzo[a]pyrene were detected in the fill sampled at B807 (Figure 2), both at a concentration of 1.1 mg/kg. This concentration exceeds the RCMP Method 1 category NH S-1 soil standard of 0.7 mg/kg for these cPAHs. The concentrations of benzo[a]anthracene and benzo[a]pyrene detected in the fill are below category NH S-3 soil standards.

2.9.2.3 Remedial Status Summary

As indicated in the previous sections, concentrations of cPAHs in the existing fill along the alignment north of the river crossing exceed the RCMP Category NH S-1/S-2 soil standards. Asbestos in the soils here also exceeded the 1 percent regulatory threshold. The development of a Remedial Action Plan (RAP) for review and approval by the NHDES will be required. The cPAH concentrations are below the Upper Concentration Limits (UCLs) in soils as defined in the RCMP, and the NHDES may allow the contaminated fill to remain in place provided it is contained beneath clean soils and rendered inaccessible to contact and inhalation exposures. At this time, we expect that the RAP will include leaving the soils in place beneath either planned roadway, riprap or stone fill for erosion protection, or a layer of

clean soil. Contaminated soils that are excavated in construction will be placed beneath clean soil cover or disposed of off site at a permitted solid waste landfill. A Parkway AUR will be developed to avoid uncontrolled exposures to the contaminated fill.

Small amounts of the fill may be disturbed in site work prior to the placement of riprap, or by drilling for installation of caisson foundations. Existing fill that is disturbed could be placed beneath the riprap erosion protection. The presence of the fill with cPAHs and asbestos contamination along the north alignment of the Nashua River crossing should be controlled under construction planning and eventual AUR. Construction activity that disturbs this fill should be done with planned safety and containment measures.

Project asbestos oversight and response planning must be provided in accordance with promulgated NH Administrative Rules for *Management and Control of Asbestos Waste Disposal Sites* Env-Wm 3900, effective February 15, 2002. The identification, control, and management of ACM encountered during construction must be performed in compliance with Env-Wm 3900.

2.9.3 Sediments In The Nashua River

2.9.3.1 Asbestos

In 1998, borings B803 through B806 were drilled in the bed of the Nashua River at the proposed bridge crossing (Figure 2). Surface sediment grab samples were collected from the riverbed at each location for PLM-asbestos analysis. No asbestos was reported found in the riverbed sediments at the crossing.

2.9.3.2 Table IV Waste Characterization

In 1998, a composite sample of shallow sediments was collected from borings B803 through B806. The sediment composite was submitted for the Table IV suite of waste characterization analyses including VOCs, ABNs, TPH, RCRA 8 total metals, pesticides, PCBs, reactive cyanide, and reactive sulfide. The results of the analyses are contained in EAI Laboratory Report #14381 provided in Volume II of this report. The results are discussed below.

- The composite of riverbed sediments sampled in October 1998 at the proposed bridge crossing was found free of reportable concentrations of VOCs, ABNs, TPH, pesticides, PCBs, and reactive cyanide and sulfide.
- The concentrations of total barium, total chromium and total lead found in the sediment composite were an order of magnitude lower than NH S-1 soil standards, and the total chromium and total lead concentrations were lower than RCMP Table 1 background concentrations of these metals in soils.
- The concentration of total arsenic found in the sediment composite was 22 mg/kg. This exceeds the RCMP Method 1 soil standard for arsenic of 11 mg/kg. RCMP category NH S-1, S-2, and S-3 soils have the same arsenic standard of 11 mg/kg.

As indicated above, the concentration of total arsenic in the sediment composite sample exceeded the RCMP Category NH S-1 soil standard. The development of a Remedial Action Plan (RAP) for review and approval by the NHDES may be required for containment and disposal of sediments dredged or disturbed by drilling caisson foundations for the bridge piers. However, since the total arsenic concentration (22 mg/kg) is below the Upper Concentration Limit (UCL) in soil as defined in the RCMP (120 mg/kg), the NHDES may allow the sediment contained and recovered in work to be left in place under riprap on the north bank of the river. It may be preferable to dewater and dispose of the sediment at an appropriate permitted off-site facility. If left as inaccessible fill under containment on-site, AUR must be established to prevent uncontrolled exposures to the material.

2.9.4 Alignment South of the Nashua River

2.9.4.1 Environmental Subsurface Investigations

Environmental subsurface investigations at the south abutment of the proposed Nashua River Bridge south of the river included excavation of test pits TP3 and TP25 in 1990, drilling of soil boring with monitoring well installed MW4 in 1990, excavation of test pits TP107 and TP108/108A in 1992, and drilling of soil borings B801 and B802 in 1998 (Figure 2). Environmental work in the south alignment has identified asbestos and the buried remnant of the 420,000-gallon AST bottom as issues of concern.

2.9.4.2 Asbestos

Wet clumps of gray fibrous material were encountered at 5 feet bgs in test pit TP3 in 1990. Analyzed by PLM the material was identified to contain 10 percent Amosite asbestos. In 1992 test pits TP108 and TP108A were excavated, respectively outside of and inside the 420,000-gallon AST bottom remnant buried in-ground within the south alignment. Outside the AST (TP108), 10 percent Chrysotile asbestos tile debris was encountered at 3 feet bgs. On the ground surface in the vicinity of TP108A 15 to 20 percent Chrysotile asbestos cement board debris was found. The anticipated presence of ACBMs on the ground and in fill will be managed in accordance with Env-Wm 3900.

In October 1998, soil borings B801 and B802 were advanced to bedrock refusal at about 60 feet bgs where the south abutment of the bridge will be constructed. Surface soils from both borings (0 to 2 feet bgs) were sampled for PLM-asbestos analysis. Both soil samples were determined to contain no asbestos.

2.9.4.3 Former 420,000–Gallon AST Bottom Remnant

The 420,000-gallon above ground storage tank (AST) was formerly used to supply fuel oil to the boiler plant for the Millyard Industrial area. Located just north of the Boiler Building (Figure 2), the partially buried AST was decommissioned by cutting the tank below grade, removing the upper portion of the tank, and backfilling the bottom remnant of the tank with boulders and other fill materials. GEI has not found written documentation of this action that

provides details of the circumstances of the in-ground closure of the AST bottom remnant and tank bottom residuals.

The following observations are based on the results of 1990 Phase II and 1992 Phase III subsurface investigations.

- The buried AST bottom remnant was found at a location directly behind (south of) the proposed south abutment of the Nashua River Bridge. Under the current design, the AST bottom would lie under paved roadbed for the bridge approach.
- The cut-off top of the AST sidewall was encountered at 6 feet below grade in poor quality fill, which extended to at least 11 feet below ground surface (bgs). The bottom of the former 420,000-gallon AST was encountered at 10 feet bgs and approximately 25 feet above the unconfined groundwater table.
- An approximately 1.5-foot thick layer of fill mixed with oily sludge was observed at the bottom of the AST. Because of frequent collapse of the test pit walls during explorations, the integrity of the tank bottom could not be determined by observation.
- Analysis of two samples collected in 1992 from the 1.5-foot thick layer of fill mixed with oily sludge at 10 feet bgs inside the tank bottom (TP107-10 and TP108A-10) resulted in concentrations of total petroleum hydrocarbons (TPH) of 12,400 and 5,600 milligrams per kilogram (mg/kg), respectively. A low level concentration of total xylenes (4.9 mg/KG) was reported in one of the samples. Analytical characterization of the oily tank bottom media for semi-volatile organic compounds (SVOCs) or inorganic metals was not done.
- During 1990 Phase II work, a soil boring with installed monitoring well was drilled approximately 100 feet north of the AST bottom remnant. The well location is inferred to be downgradient of the former fuel oil AST and the Boiler building. Monitoring well MW4 (Figure 2) was installed with a 15-foot screen in native narrowly graded sand (SP) from 29.5 to 44.5 feet below ground surface (bgs). As noted, the unconfined groundwater table was measured to be 35 feet bgs in MW4 in March 1990. Groundwater sampled in March 1990 at MW4 contained no detectable concentrations of Method 624 volatile organic compounds (VOCs) or Resource Conservation and Recovery Act (RCA) dissolved metals (As, Ba, Cd, Cr, Pb, Hg, Se, and Ag).
- 1990 and 1992 sampling for asbestos in the area of the former AST indicated ACBMs containing between 5 percent and 20 percent Chrysotile asbestos were present on the ground surface (cement board/TP108A) and in fill up to 3 feet bgs (tile debris/TP108). A bulk soil sample from 5 feet bgs in the area (1990 test pit TP3) contained fibrous cement with 10 percent Amosite asbestos. Fill in the area of the former 420,000-gallon AST and Boiler Building is potentially ACBM-contaminated.

Results of investigation indicate bottom sludge was present in the AST when it was cut-off and backfilled. This material appears to be effectively contained in the buried tank bottom structure.

Construction of the Parkway in the area of the AST bottom remnant will leave the AST residuals undisturbed under additional fill and/or pavement. Construction will reduce or eliminate surface water infiltration to the AST bottom residuals.

In correspondence to the NHDES Oil Remediation and Compliance Bureau (ORCB) dated January 18, 2001, GEI provided the results of our investigation and recommended that the former AST bottom remnant be left in place under AUR.

The NHDES ORCB agreed in correspondence dated March 23, 2001, that the fuel contaminated remnant of the former 420,000-gallon AST can remain in place as long as the AST bottom residuals are undisturbed by the proposed construction, and provided an appropriate AUR can be developed and recorded in the Registry of Deeds and/or Land Registration Office. The AUR would require that any future activity on the land will not result in a new exposure to risk of harm from the oil sludge residuals or asbestos left in the environment. The NHDES ORCB correspondence is provided in Appendix D.

3. Conclusions and Recommendations

The findings of GEI's Phase II environmental assessment of the Broad Street Parkway alignment have been presented with substantial background to place the work in context. Inventory of asbestos containing building materials (ACBMs) in commercial buildings designated for demolition are complete to the extent possible based on access allowed by the owners of the properties. Phase III of the facility asbestos work is the preparation of site-specific specifications for asbestos removal. RPF is scheduled to complete Phase III of facility asbestos work. All work on the Project going forward must be planned and performed in accordance with the new Administrative Rules for *Management and Control of Asbestos Waste Disposal Sites* (Env-Wm 3900, effective February 15, 2002). Project investigation and planning for asbestos contained in the Baldwin Street and Fimbel Door asbestos landfills and the Prescott Street uncontrolled asbestos site will be reported by GEI under separate cover.

Based on the information presented, the remediation of non-asbestos oil and hazardous material (OHM) in the Parkway's alignment to provide for conditions that are safe for the worker and protective of human health and the environment may be relatively limited. No acutely hazardous conditions of non-asbestos environmental OHM contamination have been identified to date. The conditions of environmental contamination that have been identified through investigation are judged to pose chronic low-grade hazards, where the risk of non-asbestos harm would require frequencies and intensities of contact exposure that are judged unlikely in the circumstances of the Project. Further, construction design elements of the Parkway will result in a reduced potential for contact exposures to contaminated soils, post-construction. Much of the contaminated soils and fill identified in the alignment to date can be effectively capped under the proposed Parkway construction and site restoration. With the exception of conditions identified at the NIMCo and Mel's Autobody sites, in general, the historical contaminants of fills and soils in the alignment (cPAHs and asbestos) have not degraded groundwater or surface water quality. Where the contaminated solids media are not a source of contamination to groundwater, remediation by removing or reducing the risk of potential harmful exposures should be acceptable provided long-term institutional control of the contact remedy can be administered through AUR.

At the NIMCo and Mel's Autobody sites, the contaminants in ground have resulted in degraded groundwater quality. Site investigations to date suggest limited source removal actions (LUST/floor drain closures and impacted soil excavations) should be, or are being performed. The migration and attenuation of impacts in groundwater should be monitored under the GMP program. Conditions protective of human health and the environment should be administered through GMZ.

There are areas of expected or potential environmental concern within the alignment that have not been addressed yet, or cannot be addressed yet. First among these is the Boiler Building (Figure 2), which has not been investigated beyond reconnaissance. In August 1998, GEI and RPF personnel entered the building. Extensive amounts of friable asbestos in

extremely poor condition were observed. Six, approximately 30,000-gallon fuel oil tanks (arguably ASTs or USTs) were observed in the eastern half of the building. Several of the ASTs were described as partially full and oil staining was observed in the sands used to partially bury the slab-mounted tanks for fire protection. Impacts from the suspected release of oil to the environment must be investigated. Removing the tanks, encasing sands, and excavating the floor beneath them would be recommended as an initial exploratory action. However this cannot be safely done until an asbestos abatement and demolition of the building has been performed. The management of wastes contaminated with both asbestos and oil will need to be planned for.

As yet unidentified environmental contamination may exist below buildings inside of the alignment. Some investigation of and response to environmental conditions in ground within the footprints of the buildings may be expected once the structures are removed and conditions are evaluated.

Response to the identified conditions at investigated sites discussed in detail in Section 2 must include development of a RAP in accordance with the RCMP and Env-Ws 410.23. The RCMP states that AUR necessary to protect human health and the environment should be completed prior to approval of the RAP.

- The 420,000-gallon AST bottom remnant and oil residuals can remain undisturbed in place provided an appropriate RAP is developed utilizing AUR for post-construction land use administration.
- The Mel's Autobody site is expected to require a RAP with a GMP. The final monitoring well network designed to support the GMZ must account for proposed Parkway construction in the landscape. Site work is on-going by the current owner.
- The NIMCo site will require a RAP to address contamination indicated in soils and groundwater. This site's characterization needs to be expanded to support a RAP, including the installation of additional groundwater monitoring wells. Site work should be planned in accordance with the Parkway design for the area.
- Any sediment dredged from the Nashua River at the bridge crossing should be managed as potentially arsenic-contaminated material. Disposal of stockpiled material will be based on its composite characterization. Dewatered this material may be acceptable for use under a structural element of the Parkway under AUR.
- RAP/AUR should be developed for contaminated fills and soils throughout the alignment. The RAP should utilize the construction design and site restoration in remedy of contact exposures to the extent possible. AUR will provide long-term institutional control of those conditions that provide the margin of safety.

No exceedences of RCMP Upper Concentration Limits (UCLs) for soils have been identified. And in general the historical contaminants in fills and soils of the Millyard and elsewhere in the alignment have not been shown to be a current source of degradation to groundwater quality, as dry fill leached by infiltration. Since the Parkway right-of-way will be a contiguous entity in the environment, owned by the City of Nashua, the development of a Parkway-wide AUR may be reasonable and pursued. With a Parkway-wide AUR in place,

site-specific RAPs or construction phase based RAPs can be developed incorporating AUR as appropriate, or providing for separate risk management action.

There are no identified drinking water wells threatened by known contaminated groundwater in the alignment. And, the contaminated groundwater identified in the alignment is judged not to be a threat to measurably degrade surface water in the Nashua River. At the NIMCo and Mel's Autobody sites expanded site characterizations are needed. However, based on preliminary data, GMP RAPs are expected to be adequate for groundwater restoration and risk management at these sites.

As noted, new environmental conditions may be found as demolitions of buildings occur, building footprints disappear, and earthwork proceeds. Environmental monitoring and characterization sampling should be coordinated with construction earthwork. New monitoring well installations and the maintenance of existing monitoring wells should be coordinated with construction and site restoration design.

Interim groundwater monitoring should be performed to facilitate development of GMZs and RAPs. GEI recommends existing/functional groundwater monitoring wells in the Millyard be re-sampled. This could include 1990 wells MW1, MW2 and MW4, and Phase II wells N1 and BG1. At a minimum, N1 should be re-sampled prior to developing a RAP for the NIMCo property. Analytical parameters would include VOCs, PAHs (SVOCs for N1), and dissolved metals.

Work during construction of the Parkway needs to be integrated with NHDES' inputs and environmental oversight. Project asbestos waste management and control and asbestos Site Safety and Contingency planning should be developed in conjunction with OHM health and safety planning.

questions

1) full inspections of former Plywood Ranch (Nashua Outdoor Power Equipment) & Morrison Tool Co.

2) precise location of 420,000 AST

3) Usage of arsenic laden River sediments

4) New fill area

5) Interior inspections - i.e B+G not done since 1992

6) Contingency plan & demolition - borings program

4. Schedule

GEI will contact the NHDES Waste Management Division within 15 working days after distribution of our *Phase II Environmental Services Report*. GEI will seek feedback as soon as possible from the NHDES regarding a Project approach to future environmental work and remedial action planning. Applicable and appropriate criteria to assign actionable risk thresholds for cPAH-contaminated soils will be discussed in context of Parkway AUR and RAP development. The concept and mechanics of a Parkway-wide AUR should be discussed.

The construction schedule may require interim site-specific RAPs be developed. It may be necessary to meet the Project schedule to negotiate an asbestos management and control plan for opening and reconsolidating the closed asbestos landfills, separate from an asbestos management and control plan for uncontrolled environmental asbestos encountered during construction.

GEI is in the process of preparing a scope of work and cost estimate and schedule for AUR/RAP/GMP development and recommended additional environmental task work. The proposed scope of work will include coordinating development of Parkway-wide AUR and soil RAP, site-specific RAPs with GMP components for the NIMCo and Mel's Autobody sites, additional NIMCo property and Boiler Building site investigations, and groundwater and surface water sampling for continuing characterization.

5. Limitations

This report was prepared for the use of Fay, Spofford & Thorndike, Inc. exclusively. The findings provided by GEI are based solely on the information contained within this report. GEI has relied on information provided by others, and as such, our conclusions are based on the validity of this information. Additional quantitative information regarding investigated properties may result in a modification of the conclusions stated.

The findings submitted in this report are based in part upon chemical analysis data and are thus contingent upon their validity. Fluctuations in the types and levels of environmental chemical concentrations, variations in flow paths and phase partitioning may occur over time.

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Table 1. Phase II Environmental Sampling Summary
Phase II Environmental Services Report
Broad Street Parkway
Nashua, New Hampshire

Sampling Location	General Location	Chemical Analysis Performed	
		Soils	Groundwater
MA1	Former Mel's Autobody Property; UST PSI	VOC, TPH	VOC, PAH, TPH
MA2	Former Mel's Autobody Property; UST PSI	VOC, TPH	na
MA3	Former Mel's Autobody Property; UST PSI	VOC, TPH	VOC, PAH, TPH
BG1	Barett & Gould Building, Solvent AST PSI	VOC, PAH, TPH	VOC
N1	NIMCo Building, OHM PSI	VOC, PAH, TPH	VOC, ABN
SS-1	NIMCo Building, OHM PSI	VOC, ABN, TPH	na
SS-2	NIMCo Building, OHM PSI	VOC, ABN, TPH	na
SS-3	NIMCo Building, OHM PSI	VOC, ABN, TPH	na
SS-4	NIMCo Building, OHM PSI	VOC, ABN, TPH	na
WO-1	NIMCo Building, OHM PSI	VOC, ABN, TPH	na
TP208	Bagshaw Company; Lagoons Closure PSI	VOC, ABN, TPH, Metals, Cyanide	na
TP209	Bagshaw Company; Lagoons Closure PSI	na	na

Table 1. Phase II Environmental Sampling Summary
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Broad Street Parkway
Nashua, New Hampshire

Sampling Location	General Location	Chemical Analysis Performed	
		Soils	Groundwater
B801/B802	Nashua River Bridge Crossing; PSI	VOC, PAH, TPH	na
B807	Nashua River Bridge Crossing; PSI	VOC, PAH, TPH	na
B809	Nashua River Bridge Crossing; PSI	VOC, PAH, TPH, PCB	na
B812	Nashua River Bridge Crossing; PSI	VOC, PAH, TPH	na
B813	Nashua River Bridge Crossing; PSI	VOC, PAH, TPH	na
B813	Nashua River Bridge Crossing; PSI	VOC, PAH, TPH	na
B815	Nashua River Bridge Crossing; PSI	VOC, PAH, TPH	na
B818	Nashua River Bridge Crossing; PSI	VOC, PAH, TPH	na
Nashua River	Nashua River Sediments Composite; PSI	Table IV	na

General Notes

1. Boring and test pit locations, subject buildings, and the proposed location of the Nashua River Bridge crossing are shown on Figure 2. Boring logs are contained in Appendix A. Test pit logs are contained in Appendix B. Environmental analysis was performed by Eastern Analytical, Inc. of Concord, New Hampshire (EAI). EAI Laboratory results of analysis are provided in Volume II of this report.

Abbreviations

Underground Storage Tank (UST)
Aboveground Storage Tank (AST)
Preliminary Site Investigation (PSI)
Oil and Hazardous Materials (OHM)

Chemical Analysis Abbreviations

Volatile Organic Compounds (VOC)
Polynuclear Aromatic Hydrocarbons (PAH)
Acid/Base Neutral Extractable Semi-Volatile Organic Ccompounds (ABN)
Total Petroleum Hydrocarbons (TPH)
RCRA 8 Metals (Metals)
Polychlorinated Biphenyl (PCB)
Table IV (Hazardous Waste Characterization suite including VOC, ABN, PCB, Pesticide, TPH, Metals, Cyanide, Sulfide, and Ignitibility)

Table 2. Asbestos Screening Results for Soils or Bulk Media
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Date		Location	Depth (feet)	Asbestos Content	Asbestos Type	Remarks
1990	1/12	**TP3**	**5**	**10%**	**Amosite**	Non-fibrous
	1/12	TP21	5	Non-Detect	-	Non-fibrous
1991	11/18	**Near TP101**	**Surface**	**1 to 5%**	**Chrysotile**	Misc. tile in embankment
	11/18	**Near TP102**	**Surface**	**20 to 25%**	**Chrysotile**	Cement board
	11/18	**Near TP105**	**Surface**	**20 to 25%**	**Chrysotile**	Cement board
	11/18	**Near TP106**	**Surface**	**20 to 25%**	**Chrysotile**	Cement board
	11/19	**TP108**	**3**	**5 to 10%**	**Chrysotile**	Tile Debris
	11/19	TP108A	6	<1%	Chrysotile	Suspect debris
	11/19	**TP108A**	**Surface**	**15 to 20%**	**Chrysotile**	Cement board
	11/19	**TP109**	**Surface**	**15 to 20%**	**Chrysotile**	Tar/Asphalt debris
	11/19	TP110	2	Non-Detect	-	Refractory/brick debris
	12/13	TP113	5	Non-Detect	-	-
	12/13	TP114	5	Non-Detect	-	-
	12/13	TP115	5	Non-Detect	-	-
	12/13	TP116	5	Non-Detect	-	-
	12/13	TP117	5	Non-Detect	-	-
1998	7/30	B1202	5 to 7	Non-Detect	-	5% Cellulose
	8/4	B1203	5 to 7	Non-Detect	-	5% Cellulose
	8/4	B1204	5 to 7	Non-Detect	-	5% Cellulose
	7/23	B1901	5 to 7	Non-Detect	-	1% Cellulose
	7/27	B1905	5 to 7	Non-Detect	-	1% Cellulose
	8/19	81998-HG	N/A	Non-Detect	-	98% Synthetic
	8/11	B1002	5 to 7	Non-Detect	-	Non-fibrous
	8/12	B28	5 to 7	Non-Detect	-	Non-fibrous
	8/12	B31	5 to 7	Non-Detect	-	Non-fibrous
	8/19	B1904	5 to 7	Non-Detect	-	Non-fibrous
	8/26	B1902	5 to 7	Non-Detect	-	Non-fibrous
	8/28	B505	5 to 7	Non-Detect	-	Non-fibrous
	9/1	B502	5 to 7	Non-Detect	-	Non-fibrous
	9/3	B65	5 to 7	Non-Detect	-	Non-fibrous
	9/3	B66	5 to 7	Non-Detect	-	Non-fibrous
	9/3	B70	5 to 7	Non-Detect	-	Non-fibrous
	9/3	B86	5 to 7	Non-Detect	-	Non-fibrous
	10/14	B803	5 to 7	Non-Detect	-	Non-fibrous
	10/14	B804	5 to 7	Non-Detect	-	Non-fibrous
	10/15	B805	5 to 7	Non-Detect	-	Non-fibrous
	10/15	B806	5 to 7	Non-Detect	-	Non-fibrous
	10/14	B803	0 to 2	Non-Detect	-	5% Cellulose, 10% Other
	10/19	**B808**	**0 to 2**	**2%**	**Chrysotile**	3% Cellulose, 10% Other
	10/20	B814	0 to 2	Non-Detect	-	5% Cellulose
	10/20	B812	0 to 2	Non-Detect	-	2% Cellulose
	10/21	B802	0 to 2	Non-Detect	-	Non-fibrous
	10/22	B801	0 to 2	Non-Detect	-	5% Cellulose, 10% Other
	10/27	B809	5 to 7	Non-Detect	-	Non-fibrous
	10/28	B815	5 to 7	Non-Detect	-	Non-fibrous
	10/29	B818	5 to 7	Non-Detect	-	Non-fibrous

EPA Permissible Level of asbestos percentage is <1%.

Collection Date		Location	Depth (feet)	Asbestos Content	Asbestos Type	Remarks
1998	11/9	B807	0 to 2	Non-Detect	-	Non-fibrous
	11/10	B811	0 to 2	Non-Detect	-	Non-fibrous
	11/11	B2002	0 to 2	Non-Detect	-	Non-fibrous
	11/12	B2001	0.4 to 2.4	Non-Detect	-	Non-fibrous
	11/12	B1501	0 to 2	Non-Detect	-	Non-fibrous
	11/12	B1502	5 to 7	Non-Detect	-	Non-fibrous
	11/12	B1401	0 to 2	Non-Detect	-	Non-fibrous
	11/13	B2	4.4 to 6.4	Non-Detect	-	Non-fibrous
	11/13	B3	2.4 to 4.4	Non-Detect	-	Non-fibrous
	11/13	B4	4.4 to 6.4	Non-Detect	-	Non-fibrous
	11/13	B13	0 to 2	Non-Detect	-	Non-fibrous
	11/13	B1	4 to 6	Non-Detect	-	Non-fibrous
	11/16	B88	0 to 2	Non-Detect	-	Non-fibrous
	11/16	B89	5 to 7	Non-Detect	-	Non-fibrous
	11/16	B93	0 to 2	Non-Detect	-	Non-fibrous
	11/18	B601	0 to 2	Non-Detect	-	Non-fibrous
	11/19	B603	0 to 2	Non-Detect	-	5% Cellulose
	12/1	B16	0 to 2	Non-Detect	-	10% Cellulose
	12/1	B17	5 to 7	Non-Detect	-	3% Cellulose
	12/1	B18	5 to 7	Non-Detect	-	3% Cellulose
	12/1	B20	0 to 2	Non-Detect	-	2% Cellulose
	12/1	B21	0 to 2	Non-Detect	-	5% Cellulose
	12/1	B22	5 to 7	Non-Detect	-	Non-fibrous
	12/1	B32	5 to 7	Non-Detect	-	Non-fibrous
	12/1	B39	0 to 2	Non-Detect	-	15% Cellulose
	12/2	B38	0 to 2	Non-Detect	-	5% Cellulose
	12/3	B810	0 to 2	Non-Detect	-	3% Cellulose
	12/4	B813	0 to 2	Non-Detect	-	10% Cellulose
	12/8	B816	0.5 to 2.5	Non-Detect	-	5% Cellulose
	12/8	B817	0 to 2	Non-Detect	-	5% Cellulose
	12/15	**TP120**	**0.7 to 1.2**	**10%**	**Chrysotile**	10% Other
	12/15	TP121	0 to 1.5	Non-Detect	-	Non-fibrous
	12/15	TP125	0 to 1.5	Non-Detect	-	2% Cellulose
	12/15	TP130	1 to 6	Non-Detect	-	2% Cellulose
	12/15	TP124	0 to 1	Non-Detect	-	3% Cellulose
	12/16	TP122	0.5 to 2.5	Non-Detect	-	5% Cellulose
	12/16	TP123	0 to 2.5	Non-Detect	-	3% Cellulose
	12/16	TP126	0 to 1.5	Non-Detect	-	Non-fibrous
	12/16	TP127	0 to 6	Non-Detect	-	5% Cellulose
	12/16	TP128	0 to 1	Non-Detect	-	10% Cellulose
	12/16	TP129	0 to 3	Non-Detect	-	Non-fibrous
	12/16	TP136	0 to 1.5	Non-Detect	-	Non-fibrous
	12/17	TP131	6.5 to 8.5	Non-Detect	-	Non-fibrous
	12/17	TP132	8 to 9.5	Non-Detect	-	3% Cellulose
	12/17	TP133	0 to 1	Non-Detect	-	Non-fibrous
	12/17	TP134	1 to 7	Non-Detect	-	Non-fibrous

EPA Permissible Level of asbestos percentage is <1%.

Collection Date		Location	Depth (feet)	Asbestos Content	Asbestos Type	Other Fibrous Content
2001	4/11	**TP224**	**4**	**30%**	**Chrysotile**	10% Cellulose
	4/11	**TP222**	**3**	**25%**	**Chrysotile**	10% Cellulose
	4/18	TP220	4	Non-Detect	-	3% Cellulose
	4/18	TP219	3	Non-Detect	-	2% Cellulose
	4/18	TP227D	10	Non-Detect	-	2% Cellulose
	4/18	**TP227D**	**2**	**20%**	**Chrysotile**	80% Non-fibrous
	4/19	**TP227E**	**4**	**15%**	**Chrysotile**	85% Non-fibrous
	4/19	**TP228**	**2**	**15%**	**Chrysotile**	85% Non-fibrous
	4/19	TP228	4	<1%	Chrysotile	98% Non-fibrous
	4/19	**TP229**	**2**	**10%**	**Chrysotile**	90% Non-fibrous
	4/19	TP229	5	<1%	Chrysotile	Non-fibrous
	4/19	**TP229**	**5**	**10%**	**Chrysotile**	90% Non-fibrous
	4/19	TP230	3	Non-Detect	-	3% Cellulose
	4/19	TP231	6	Non-Detect	-	2% Cellulose
	4/19	TP231	12	Non-Detect	-	2% Cellulose
	4/19	TP232	10	Non-Detect	-	2% Cellulose
	4/19	TP233	3	Non-Detect	-	2% Cellulose
	4/19	TP234	6	Non-Detect	-	2% Cellulose
	4/19	**TP235**	**0.5**	**10%**	**Chrysotile**	90% Non-fibrous
	4/19	TP237	3	Non-Detect	-	2% Cellulose
	4/19	TP238	3	Non-Detect	-	2% Cellulose
	4/20	TP240	2	Non-Detect	-	2% Cellulose
	4/20	TP241	4	Non-Detect	-	Non-fibrous
	4/20	TP242	10	Non-Detect	-	2% Cellulose
	4/20	**TP242**	**10**	**10%**	**Chrysotile**	5% Other,85% Non-fibrous
	4/20	TP243	2	Non-Detect	-	Non-fibrous
	4/20	TP247	3	Non-Detect	-	Non-fibrous
	4/23	**TP200**	**6**	**15%**	**Chrysotile**	85% Non-fibrous
	4/23	TP200	18	<1%	Chrysotile, Amosite	2% Cellulose
	4/23	TP201	14	<1%	Chrysotile	3% Cellulose
	4/23	TP202	15	<1%	Chrysotile	2% Cellulose
	4/24	TP204	2	Non-Detect	-	2% Cellulose
	4/24	TP205	2	Non-Detect	-	3% Cellulose
	4/24	**TP206**	**5**	**2%**	**Chrysotile**	3% Cellulose

EPA Permissible Level of asbestos percentage is <1%.

General Notes

1. Asbestos content determined by RPF Associates, Inc. of Lee, NH (RPF) using Polarized Light Microscopy – EPA Method 600/R-93/116 (PLM).

2. Soil boring and test pit locations are shown on Figure 2. Boring logs are contained in Appendix A. Test pit logs are contained in Appendix B.

Table 3.
Summary of Chemical Testing Results - Soil Samples
Mel's Autobody
Phase II Environmental Services Report
Broad Street Parkway
Nashua, New Hampshire

						Sample Location:	MA1-S6	MA1-S7	MA2-S4	MA3-S6
						Sample Depth (ft):	25-27	30-31.7	15-17	25-27
						Date Collected:	3/1/01	3/1/01	3/1/01	2/28/01
Analyte	Method	Units	RCMP Standard							
			NH-S1	NH-S2	NH-S3					
Volatile Organic Compounds (VOCs)	8260B	mg/kg								
Ethylbenzene			140	140	140	4.9	NT	< 0.05	< 0.05
Xylene, Total			500	1,000	1,100	7.1	NT	< 0.05	< 0.05
iso-Propylbenzene			123	123	123	4.2	NT	< 0.05	< 0.05
n-Propylbenzene			(a)	(a)	(a)	18.0	NT	< 0.05	< 0.05
1,3,5-Trimethylbenzene			(a)	(a)	(a)	23.0	NT	< 0.05	< 0.05
1,2,4-Trimethylbenzene			(a)	(a)	(a)	72.0	NT	< 0.05	< 0.05
sec-Butylbenzene			(a)	(a)	(a)	3.6	NT	< 0.05	< 0.05
p-Isopropyltoluene			(a)	(a)	(a)	1.4	NT	< 0.05	< 0.05
n-Butylbenzene			(a)	(a)	(a)	15.0	NT	< 0.05	< 0.05
Alkylbenzenes, total			59	59	59	133	NT	0.15	0.15
Toluene			100	100	100	0.4	NT	< 0.05	< 0.05
Total Petroleum Hydrocarbons (TPH) (C9-C40)	8100mod	mg/kg	10,000	10,000	10,000	130	< 50	< 50	< 50

General Notes:
1. Only analytes detected in at least one sample are reported here. For a complete list of analytes see the laboratory data sheets.
2. ft = feet
3. mg/kg = milligrams per kilogram
4. RCMP = New Hampshire Risk Characterization and Management Policy, January 1998
5. "<" = Analyte not detected at a concentration above the specified laboratory reporting limit.
6. NT = Not tested for this analyte.
7. Bolded values indicate an exceedance of the NHDES Method 1 S-1 soil standard.
8. Analytes not detected at a concentration above the specified reporting limit were assumed to have a concentration 1/2 the reporting limit.

Footnotes:
a. The sum total of these compounds is compared with the NH RCMP standard for Alkylbenzenes.

Table 4.
Summary of Chemical Testing Results - Groundwater Samples
Mel's Autobody
Phase II Environmental Services Report
Broad Street Parkway
Nashua, New Hampshire

Analyte	Method	Units	Method 1 Standards NH-GW1	MA1 5-6 3/28/01	MA3 6 3/28/01*
Volatile Organic Compounds (VOCs)	8260B	ug/L			
Toluene			1,000	90	< 1
Ethylbenzene			700	290	< 1
Xylenes			10,000	820	< 1
iso-propylbenzene			800	70	< 1
n-propylbenzene			(a)	220	< 1
1,3,5-Trimethylbenzene			(a)	300	< 1
1,2,4-Trimethylbenzene			(a)	1,000	< 1
sec-Butylbenzene			(a)	30	< 1
p-isopropyltoluene				10	< 1
n-Butylbenzene			(a)	90	< 1
Alkyl Benzenes			50	**1,650**	2.5
Total Petroleum Hydrocarbons (TPH) (C9-C40)	8100mod	mg/L	-	2.3	< 0.5
Semi-Volatile Organic Compounds (SVOCs)	8270C	ug/L			
Naphthalene			20	11	< 1
2-Methylnaphthalene			280	3	< 1

General Notes:
1. Only analytes detected in at least one sample are reported here. For a complete list of analytes see the laboratory data sheets.
2. mg/L = milligrams per liter
3. ug/L = micrograms per liter
4. RCMP = New Hampshire Risk Characterization and Management Policy, January 1998
5. "<" = Analyte not detected at a concentration above the specified laboratory reporting limit.
6. NT = Not tested for this analyte.
7. Bolded and shaded values indicate an exceedance of the NHDES Method 1 GW-1 standard.
8. Analytes not detected at a concentration above the specified reporting limit were assumed to have a concentration 1/2 the reporting limit.

* SVOCs and TPH sample collected from MA3 were collected on 4/9/01.

Footnotes:
a. The sum total of these compounds is compared with the NH RCMP standard for Alkylbenzenes.

Table 5.
Summary of Chemical Testing Results - Soil Samples
Barett & Gould
Phase II Environmental Services Report
Broad Street Parkway
Nashua, New Hampshire

						Sample Location:	BG1-S17	TP135[b]	HA-1
						Sample Depth (ft):	33-35	0-2	0-6
						Date Collected:	3/7/01	12/18/98	5/15/01
Analyte	**Method**	**Units**	**RCMP Standard**						
			NH-S1	**NH-S2**	**NH-S3**				
Volatile Organic Compounds (VOCs)	8260B	mg/kg							
Tetrachloroethene			2	2	2		< 0.05	0.05	< 0.09
Trichloroethane			0.8	0.8	0.8		< 0.05	0.07	< 0.09
Total Petroleum Hydrocarbons (TPH)	8100	mg/kg	10,000	10,000	10,000		< 50	NT	< 50
Semi-Volatile Organic Compounds (SVOCs)	8270C	mg/kg							
bis(2-Ethylhexyl)phthalate			39	110	2200		NT	NT	0.5
Acenaphthene			300	300	300		< 0.04	NT	0.08
Fluorene			510	510	510		< 0.04	NT	0.07
Anthracene			1000	1700	1700		< 0.04	NT	0.22
Fluoranthene			810	2,500	5,000		< 0.04	NT	1.6
Benzo[a]anthracene			0.7	2	40		< 0.04	NT	0.74
Chrysene			70	200	4,000		< 0.04	NT	0.83
Benzo[b]fluoranthene			7	20	400		< 0.04	NT	0.88
Benzo[k]fluoranthene			7	20	400		< 0.04	NT	0.59
Benzo[a]pyrene			0.7	0.7	4		< 0.04	NT	0.74
Indeno[1,2,3-cd]pyrene			0.7	2	40		< 0.04	NT	0.44
Dibenz[a,h]anthracene			0.7	0.7	4		< 0.04	NT	0.13
Benzo[g,h,i]perylene			(a)	(a)	(a)		< 0.04	NT	0.46
Phenanthrene			(a)	(a)	(a)		< 0.04	NT	1.00
Pyrene			(a)	(a)	(a)		< 0.04	NT	1.30
Total (a)			480	2,400	5,000		0.06	NT	2.76
Chloride	325.2	mg/kg	-	-	-		NT	NT	10
Alkalinity Total (as CaCO3)	310.1	mg/kg	-	-	-		NT	NT	2,400
Specific Conductance	120.1	uS	-	-	-		NT	NT	240
Ignitability	7.1.2	No Units	-	-	-		NT	NT	pass
Corrosivity	9045	SU	-	-	-		NT	NT	6.7
PCBs/Pesticides	8081A/8082	mg/kg	-	-	-		NT	NT	ND
TCLP Metals	6020	mg/kg	-	-	-		NT	NT	ND
Reactive Cyanide	7.3.3.2	mg/kg	-	-	-		NT	NT	< 0.2
Reactive Sulfide	7.3.4.2	mg/kg	-	-	-		NT	NT	< 10
Herbicides	8151	ug/kg	-	-	-		NT	NT	ND

General Notes:
1. Only analytes detected in at least one sample are reported here. For a complete list of analytes see the laboratory data sheets.
2. ft = feet
3. mg/kg = milligrams per kilogram
4. RCMP = New Hampshire Risk Characterization and Management Policy, January 1998
5. "<" = Analyte not detected at a concentration above the specified laboratory reporting limit.
6. NT = Not tested for this analyte.
7. Bolded values indicate an exceedance of the NHDES Method 1 S-1 soil standard.
8. Analytes not detected at a concentration above the specified reporting limit were assumed to have a concentration 1/2 the reporting limit

Footnotes:
a. The sum total of these compounds is compared with the NH RCMP standard.
b. The 1998 sample identification was TP21. This has been changed in this table to reflect the revised test pit numbering used today.

Table 6.
Summary of Chemical Testing Results - Groundwater Samples
Barett & Gould
Phase II Environmental Services Report
Broad Street Parkway
Nashua, New Hampshire

Analyte	Method	Units	Method 1 Standards NH-GW1	BG1 3/28/01
Volatile Organic Compounds (VOCs)	8260B	ug/L		
1,1,1- Trichloroethane			200	2

General Notes:
1. Only analytes detected in at least one sample are reported here. For a complete list of analytes see the laboratory data sheets.
2. ug/L = micrograms per liter
3. RCMP = New Hampshire Risk Characterization and Management Policy, January 1998
4. "<" = Analyte not detected at a concentration above the specified laboratory reporting limit.
5. NT = Not tested for this analyte.
6. Bolded and shaded values indicate an exceedance of the NHDES Method 1 GW-1 standard.

Table 7.
Summary of Chemical Testing Results - Soil Samples
NIMCo
Phase II Environmental Services Report
Broad Street Parkway
Nashua, New Hampshire

Analyte	Method	Units	RCMP Standard NH-S1	RCMP Standard NH-S2	RCMP Standard NH-S3	Sample Location: WO-1	SS-1	SS-2	SS-3	SS-4	N1-S3	TP136
						Sample Depth (ft): 0-1	0-1	0-1	0-1	0-1	10-12	0-1.5
						Date Collected: 4/25/01	4/25/01	4/25/01	4/25/01	4/25/01	3/5/01	12/16/98
Volatile Organic Compounds (VOCs)	8260B	mg/kg										
Xylene, Total			500	1,000	1,100	< 0.06	0.35	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
Napthalene			5	5	5	< 0.4	< 0.4	< 0.3	0.4	0.7	< 0.3	< 0.01
2-Butanone (MEK)-Methyl Ethyl Ketone			2	2	2	< 0.6	< 0.7	< 0.5	**3.9**	< 0.5	< 0.5	< 0.1
Benzene			0.3	0.3	0.3	< 0.06	0.14	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
Trichloroethene-Trichloroethylene			0.8	0.8	0.8	< 0.06	< 0.07	< 0.05	0.12	< 0.05	< 0.05	< 0.01
Toluene			100	100	100	< 0.06	0.5	< 0.05	< 0.05	< 0.05	< 0.05	< 0.01
Total Petroleum Hydrocarbons (TPH) (C9-C40)	8100mod	mg/kg	10,000	10,000	10,000	3200	260	< 50	610	1100	< 50	180
Semi-Volatile Organic Compounds (SVOCs)	8270C	mg/kg										
3,3'-Dichlorobenzidine			1.3	1.3	1.3	< 0.2	< 0.2	< 0.2	0.5	< 0.9	NT	NT
Carbazole			-	-	-	< 0.2	< 0.2	< 0.2	2.8	5.7	NT	NT
bis(2-Ethylhexyl)phthalate-Di(ethylhexyl)phtalate			39	110	2,200	< 0.2	1.1	< 0.2	0.5	< 0.9	NT	NT
Dibenzofuran			-	-	-	< 0.04	< 0.04	< 0.04	0.9	1.9	NT	NT
Naphthalene			5	5	5	< 0.04	0.05	< 0.04	0.66	2.4	< 0.04	0.1
2-Methylnaphthalene			150	150	150	< 0.04	< 0.04	< 0.04	0.31	0.7	< 0.04	< 0.1
Acenaphthylene			300	300	300	< 0.04	< 0.04	< 0.04	0.2	< 0.2	< 0.04	0.3
Acenaphthene			270	270	270	< 0.04	0.1	< 0.04	1.2	2.7	< 0.04	0.4
Fluorene			510	510	510	< 0.04	0.07	< 0.04	1.2	2.6	< 0.04	0.4
Anthracene			1,000	1,700	1,700	< 0.04	0.34	< 0.04	3.5	7.9	< 0.04	1.3
Fluoranthene			810	2,500	5,000	0.06	2.1	0.13	29	68	< 0.04	6.9
Benzo[a]anthracene			0.7	2	40	< 0.04	**1.1**	0.12	**11**	**26**	< 0.04	**4.9**
Chrysene			70	200	4,000	< 0.04	0.9	0.06	12	20	< 0.04	4.8
Benzo[b]fluoranthene			7	20	400	< 0.04	0.97	0.05	**15**	**18**	< 0.04	5.8
Benzo[k]fluoranthene			7	20	400	< 0.04	0.53	< 0.04	**8.5**	**10**	< 0.04	1.7
Benzo[a]pyrene			0.7	0.7	4	< 0.04	**0.85**	0.06	**11**	**14**	< 0.04	**4.2**
Indeno[1,2,3-cd]pyrene			0.7	2	40	< 0.04	0.36	< 0.04	**2.9**	**7.6**	< 0.04	**1.5**
Dibenz[a,h]anthracene			0.7	0.7	4	< 0.04	< 0.04	< 0.04	**1.5**	**3.1**	< 0.04	0.5
Benzo[g,h,i]perylene			(b)	(b)	(b)	< 0.04	0.38	< 0.04	3.5	7	< 0.04	1.5
Phenanthrene			(b)	(b)	(b)	< 0.04	1.5	0.07	20	51	< 0.04	5.7
Pyrene			(b)	(b)	(b)	0.11	1.8	0.11	30	48	< 0.04	8.8
Total (b)			480	2,400	5,000	0.15	4	0.2	54	106	0.06	16

General Notes:
1. Only analytes detected in at least one sample are reported here. For a complete list of analytes see the laboratory data sheets.
2. ft = feet
3. mg/kg = milligrams per kilogram
4. RCMP = New Hampshire Risk Characterization and Management Policy, January 1998
5. "<" = Analyte not detected at a concentration above the specified laboratory reporting limit.
6. NT = Not tested for this analyte.
7. Bolded and shaded values indicate an exceedance of the NHDES Method 1 S-1 soil standard.
8. Analytes not detected at a concentration above the specified reporting limit were assumed to have a concentration 1/2 the reporting limit

Footnotes:
a. The sum total of these compounds is compared with the NH RCMP standard for Alkylbenzenes.
b. The sum total of these compounds is compared with the NH RCMP standard.

Table 8.
Summary of Chemical Testing Results - Groundwater Samples
NIMCo
Phase II Environmental Services Report
Broad Street Parkway
Nashua, New Hampshire

Analyte	Method	Units	RCMP Standards NH-GW1	N1 3/28/01
Volatile Organic Compounds (VOCs)	8260B	ug/L		
2-Butanone - Methyl Ethyl Ketone			170	**200**
Xylenes			10,000	**3**
1,2,4-Trimethylbenzene			(a)	**1**
Alkyl Benzenes			50	**1**
Semi-Volatile Organic Compounds (SVOCs)	8270C	ug/L		
bis(2-Ethylhexyl)phthalate			6	**20**
Phenanthrene			210	**1**
Fluoranthene			280	**1**
Pyrene			210	**1**

General Notes:
1. Only analytes detected in at least one sample are reported here. For a complete list of analytes see the laboratory data sheets.
2. ug/kg = micrograms per liter
3. RCMP = New Hampshire Risk Characterization and Management Policy, January 1998
4. "<" = Analyte not detected at a concentration above the specified laboratory reporting limit.
5. NT = Not tested for this analyte.
6. Bolded and shaded values indicate an exceedance of the NHDES Method 1 GW-1 standard.

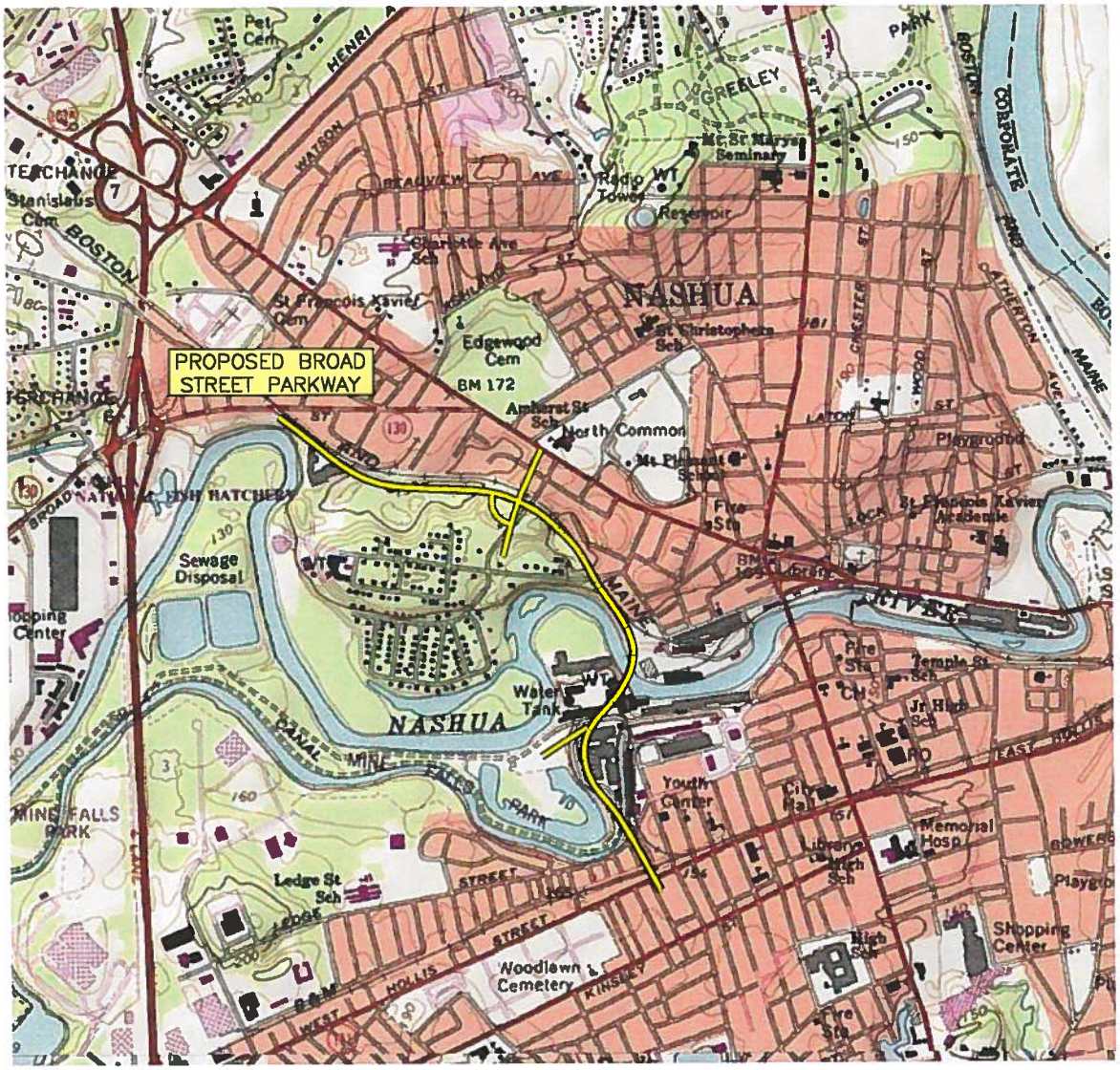
Footnotes:
a. The sum total of these compounds is compared with the NH RCMP standard for Alkylbenzenes.

Table 9.
Summary of Chemical Testing Results - Soil Samples
Bagshaw Co. Lagoons
Phase II Environmental Services Report
Broad Street Parkway
Nashua, New Hampshire

						Sample Location:	TP208-5'-6'	TP208-6'
						Sample Depth (ft):	5-6	6
						Date Collected:	4/23/01	4/23/01
Analyte	Method	Units	RCMP Standard					
			NH-S1	NH-S2	NH-S3			
Volatile Organic Compounds (VOCs)	8260B	mg/kg						
1,1,1-Trichloroethane			42	42	42		0.21	< 0.08
Total Petroleum Hydrocarbons (TPH) (C9-C40)	8100mod	mg/kg	10,000	10,000	10,000		160	1,700
Semi-Volatile Organic Compounds (SVOCs)	8270C	mg/kg						
Carbazole			-	-	-		0.4	< 0.2
Dibenzofuran			-	-	-		0.12	< 0.04
Naphthalene			5	5	5		0.09	0.07
2-Methylnaphthalene			150	150	150		< 0.04	0.17
Acenaphthylene			300	300	300		0.1	< 0.04
Acenaphthene			270	270	270		0.32	0.23
Fluorene			510	510	510		0.23	0.21
Anthracene			1,000	1,700	1,700		0.76	0.49
Fluoranthene			810	2,500	5,000		7.4	1.1
Benzo[a]anthracene			0.7	2	40		3.7	0.7
Chrysene			70	200	4,000		3.7	0.49
Benzo[b]fluoranthene			7	20	400		4.4	0.48
Benzo[k]fluoranthene			7	20	400		1.8	0.28
Benzo[a]pyrene			0.7	0.7	4		3.4	0.44
Indeno[1,2,3-cd]pyrene			0.7	2	40		1.4	0.2
Dibenz[a,h]anthracene			0.7	0.7	4		0.43	0.13
Benzo[g,h,i]perylene			(a)	(a)	(a)		1.5	0.23
Phenanthrene			(a)	(a)	(a)		3.5	1.5
Pyrene			(a)	(a)	(a)		6.6	1.2
Total (a)			480	2,400	5,000		12	3
Cyanide Total	9010A	mg/kg	100	500	500		< 0.5	< 0.5
RCRA 8 Metals	6020	mg/kg						
Arsenic			11	11	11		12	8
Barium			750	2,500	3,400		87	72
Total Chromium			130	460	540		38	19
Lead			400	400	400		87	170

General Notes:
1. Only analytes detected in at least one sample are reported here. For a complete list of analytes see the laboratory data sheets.
2. ft = feet
3. mg/kg = milligrams per kilogram
4. RCMP = New Hampshire Risk Characterization and Management Policy, January 1998
5. "<" = Analyte not detected at a concentration above the specified laboratory reporting limit.
6. NT = Not tested for this analyte.
7. Bolded and shaded values indicate an exceedance of the NHDES Method 1 S-1 soil standard.
8. RCMP standard for Chromium VI used for comparison to total chromium analytical result.
9. Analytes not detected at a concentration above the specified reporting limit were assumed to have a concentration 1/2 the reporting limit.

Footnotes:
a. The sum total of these compounds is compared with the NH RCMP standard.



SCALE, FEET

0 2,000 4,000

0 0.5 1.0

SCALE, MILES

QUADRANGLE LOCATION

NOTES:

1. FIGURE REPRODUCED FROM U.S.G.S. 7.5 MINUTE SERIES – TOPO! NATIONAL GEOGRAPHIC HOLDINGS, 2001.
2. CONTOUR INTERVAL IS 10 FEET (NATIONAL GEODETIC VERTICAL DATUM OF 1929)

Fay, Spofford & Thorndike, Inc. Bedford, New Hampshire	Phase II Environmental Services Report Broad Street Parkway Nashua, New Hampshire	SITE LOCATION PLAN
GEI Consultants, Inc.	Project 98217	April 2002 Fig. 1

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